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INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

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CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY

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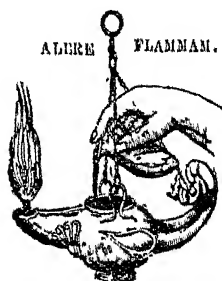
1922.

"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bontas* Creatoris; ex pulchritudine *sapientia* Domini, ex œconomiâ in conservatione, proportiono, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper astimata; à verè eruditis et sapientibus semper exulta; malè doctis et barbaris semper inimica fuit."—LINNÆUS.

"Quel que soit le principe de la vie animale, il ne faut qu'ouvrir les yeux pour voir qu'elle est le chef-d'œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations."—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

. . . . . The sylvan powers  
Obey our summons; from their deepest dells  
The Dryads come, and throw their garlands  
And odorous branches at our feet; the Nymphs  
That press with nimble step the mountain-thyme  
And purple heath-flower come not empty-handed,  
But scatter round ten thousand forms minute  
Of velvet moss or lichen, torn from rock  
Or rifted oak or cavern deep: the Naiads too  
Quit their loved native stream, from whose smooth face  
They crop the lily, and each sedge and rush  
That drinks the rippling tide. the frozen poles,  
Where peril waits the bold adventurer's tread,  
The burning sands of Borneo and Cayenne,  
All, all to us unlock their secret stores  
And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.



# CONTENTS OF VOL. IX.

## [NINTH SERIES.]

### NUMBER 49.

	Page
I. Notes from the Gatty Marine Laboratory, St. Andrews.—No. XLIV. By Prof. M'INTOSH, M.D., LL.D., D.Sc., F.R.S., &c. (Plates I.-III.) .....	1
II. New Species of <i>Carabidae</i> from South Africa. By C. N. BARKER, F.E.S. ....	30
III. Some new Species of Earthworms belonging to the Genus <i>Glyphidrilus</i> . By C. R. NARAYAN RAO, M.A., University of Mysore, Bangalore .....	51
IV. An Account of the <i>Castniinae</i> in the Collection of Madame Gaston Fournier [Lepidoptera]. By PERCY I. LATHY, F.E.S. (Plate IV.) .....	68
V. New Mammals from French Indo-China and Siam. By HERBERT C. ROBINSON and C. BODEN KLOSS .....	87
VI. On some new or little-known South African Grasshoppers. By B. P. UVAROV, F.E.S., Assistant Entomologist, Imperial Bureau of Entomology .....	99
VII. Descriptions of new Species of <i>Staphylinidae</i> from the West Indies. By MALCOLM CAMERON, M.B., R.N., F.E.S.—Part II. ..	113
VIII. On some Earthworms from India and Palestine belonging to the British Museum. By J. STEPHENSON, M.B., D.Sc., Lecturer in Zoology, University of Edinburgh .....	129
IX. Hitherto undescribed <i>Platygodidae</i> and <i>Scolytidae</i> from Portuguese East Africa. By Lt.-Col. WINN SAMPSON, F.E.S. ....	137
X. On some interesting Hedgehogs from the Persian Gulf. By OLDFIELD THOMAS. ....	142

### NUMBER 50.

XI. New or little-known <i>Tipulidae</i> (Diptera)—VIII. Australasian Species. By CHARLES P. ALEXANDER, Ph.D., F.E.S., Urbana, Illinois, U.S.A. ....	145
XII. Notes on Myriapoda.—XXVI. The Names of some <i>Iulidae</i> and <i>Blaniulidae</i> . By the Rev. S. GRAHAM BRADY-BIRKS, M.Sc. (Manchester), Lecturer in Zoology and Geology, S.E. Agricultural College (University of London), Wye, Kent .....	160
XIII. On the Spiders captured by Mr. C. S. Elton at Spitsbergen and Bear Island in 1921. Results of the Oxford University Expedition to Spitsbergen.—No. 5. By A. RANDELL JACKSON. ....	163

	Page
XIV. Note on the Genus <i>Tragosua</i> , Gray. By ARTHUR DENDY, D.Sc., F.R.S., Professor of Zoology in the University of London (King's College) . . . . .	163
XV. Three new Races of <i>Cephalophus monticola</i> . By GILBERT BLAINE . . . . .	174
XVI. On some new and rare British Diplopods. By RICHARD S. BAGNALL, F.R.S.E., F.L.S. . . . .	176
XVII. The Mammals of the 1921 Mount Everest Expedition. By OLDFIELD THOMAS, F.R.S., and MARTIN A. C. HINTON . . . . .	178
XVIII. On some new Forms of <i>Ochotona</i> . By OLDFIELD THOMAS . . . . .	187
XIX. Some Notes on Ferret-Badgers. By OLDFIELD THOMAS . . . . .	193
XX. On the Systematic Arrangement of the Marmosets. By OLDFIELD THOMAS . . . . .	196
XXI. The Holotype of <i>Parazetes auchenicus</i> , Slater (Pycnogonida). By W. T. CALMAN, D.Sc., F.R.S. . . . .	199
XXII. Note on a Bear ( <i>Ursus savini</i> , sp. n.) from the Cromer Forest-bed. By C. W. ANDREWS, D.Sc., F.R.S. (British Museum, Natural History) . . . . .	204
XXIII. Notes on Myriapoda.—XXVII. Wandering Millipedes. By the Rev. S. GRAHAM BRADY-BIRKS, M.Sc. (Manchester), Lecturer in Zoology and Geology, South-Eastern Agricultural College (University of London), Wye, Kent . . . . .	208
XXIV. A Preliminary Note on some new Nematode Parasites from the Elephant. By M. KHALIL, M.D., D.P.H., D.T.M. & H. . . . .	212
The 'Zoological Record' . . . . .	216

#### NUMBER 51.

XXV. The African Species of <i>Ebæus</i> , Er., with an Account of their accessory ♂-characters [Coleoptera]. By G. C. CHAMPION, F.Z.S. . . . .	217
XXVI. Descriptions and Records of Bees.—XCII. By T. D. A. COCKERELL, University of Colorado . . . . .	242
XXVII. Note on the Oesophageal Teeth of the <i>Stromatidæ</i> . By J. D. F. GILCHRIST, M.A., D.Sc. . . . .	249
XXVIII. A short Description of the Genitalia of ( <i>Ancistracephalus</i> ) <i>polypteri</i> , Leydig, 1853. By A. J. HESSE, B.Sc. . . . .	255
XXIX. A Subdivision of the Genus <i>Uromys</i> . By OLDFIELD THOMAS . . . . .	260
XXX. New Mammals from New Guinea and neighbouring Islands. By OLDFIELD THOMAS . . . . .	261
XXXI. A new Marmoset from the Lower Amazons. By OLDFIELD THOMAS . . . . .	265
XXXII. The Generic Classification of the <i>Taphozous</i> Group. By OLDFIELD THOMAS . . . . .	266

	Page
XXXIII. Preliminary Note on a new Genus of Scatopsid Flies from New Zealand. By F. W. EDWARDS .....	267
XXXIV. A Note on the Jurassic Dipteron, <i>Platyura filtoni</i> , Biedie. By F. W. EDWARDS .....	269
XXXV. Exotic <i>Muscaridæ</i> (Diptera).—V. By J. R. MALLOCH, Washington, D.C. ....	271

## NUMBER 52.

XXXVI. Papers on Oriental <i>Carabidæ</i> .—VII. By H. E. ANDREWES .....	281
XXXVII. The Forms of <i>Jaculus jaculus</i> in Egypt and Syria. By OLDFIELD THOMAS. ....	295
XXXVIII. New or little-known <i>Tipulidæ</i> (Diptera).—IX. Australasian Species. By CHARLES P. ALEXANDER, Ph.D., F.E.S., Urbana, Illinois, U.S.A. ....	297
XXXIX. Two new Jerboa-rats ( <i>Notomys</i> ). By OLDFIELD THOMAS .....	315
XL. Three new Fishes from Zululand and Natal, collected by Mr. H. W. Bell Marley; with Additions to the Fish Fauna of Natal. By J. R. NORMAN .....	318
XLI. The First Eremochæteous Dipteron with Vestigial Wings. By Prof. M. Buzzi, Turin, Italy .....	323
XLII. Some new Brazilian <i>Gonyleptidæ</i> . By MELLO-LEITÃO, M.D., Fellow of the Brazilian Academy of Sciences and of the Entomological Society of France .....	329
XLIII. Descriptions de Variétés, Espèces et Genres nouveaux appartenant à la Famille des Coccinellides. Par le Dr. SIGARD, Médecin-Principal de l'armée .....	349
XLIV. Descriptions and Records of Bees.—XCIII. By T. D. A. COCKERELL, University of Colorado .....	360
XLV. The Morphology of some Cretaceous Cirripedes. By THOMAS H. WITHERS, F.G.S. (Plate V.) .....	368
XLVI. <i>Deuterophlebia mirabilis</i> , gen. et sp. n., a remarkable Dipterous Insect from Kashmir. By F. W. EDWARDS. (Plate VI.) ..	379
XLVII. A Note on some supposed new Species of Earthworms of the Genus <i>Glyphidrilus</i> . By J. STEPHENSON, M.B., D.Sc., Lecturer in Zoology, University of Edinburgh. ....	387
XLVIII. On the Animals known as "Ground-Hogs" or "Cane-Rats" in Africa. By OLDFIELD THOMAS .....	389
XLIX. On new Species of <i>Alcides</i> from the Oriental Region. By GUY A. K. MARSHALL, C.M.G., D.Sc. (Plate VII.) .....	393
L. On the Names of certain Parrots of the Genus <i>Larus</i> , Bodd. = <i>Eclectus</i> , Wagl. By Lord ROTHSCHILD, F.R.S. ....	411
LI. Note on a new Snow-Vole from Montenegro [ <i>Microtus (Chionomys) bogdanovi</i> , sp. n.]. By V. and E. MARTINO .....	413

	Page
LII. A new Trichostrongyle Genus from an Armadillo, <i>Euphrecatus villosus</i> . By R. J. ORFLEPP, M.A. ....	413
LIII. A new Cestode and other Parasitic Worms from Spitsbergen, with a Note on Two Leeches. Results of the Oxford University Expedition to Spitsbergen.—No. 6. By H. A. BAYLIS, M.A., D.Sc. ....	421
LIV. New Ants from Australia. By W. C. CRAWLEY, B.A., F.E.S., F.R.M.S. ....	427
LV. Annélides Polychètes de l'Expédition de l'Université d'Oxford au Spitzberg en 1921. Par PIERRE FAUVEL, Professeur à l'Université catholique d'Angers ....	449
Proceedings of the Geological Society .....	455

## NUMBER 53.

LVI. A Preliminary List of the <i>Arctiinae</i> of Pará, Brazil, and a few from other Localities. By Lord ROTHSCHILD, F.R.S., Ph.D. ....	457
LVII. Notes on some Parasitic Nematodes. By H. A. BAYLIS, M.A., D.Sc. ....	494
LVIII. New or little-known <i>Tipulidæ</i> (Diptera).—X. Australasian Species. By CHARLES P. ALEXANDER, Ph.D., Urbana, Illinois, U.S.A. ....	505
LIX. A few new African Cetoniine Beetles. By GILBERT J. ARROW, F.Z.S., F.E.S. (Plate VIII.) ....	525
LX. Fishes from Tobago. By J. R. NORMAN ....	533
LXI. Note on the Forward Progression in its Shell of the Animal of the Nautiloidæ and Ammonoidea. Compiled from Notes left by the late G. C. CRICK, F.G.S., by B. B. WOODWARD, F.L.S. ....	536
LXII. On some new or little-known South African Grasshoppers of the Subfamily <i>Acridinæ</i> (Orthoptera). By B. P. UVAROV, F.E.S., Assistant Entomologist, Imperial Bureau of Entomology ....	539
LXIII. An interesting new Grasshopper from Mount Everest. By B. P. UVAROV, F.E.S. ....	551
LXIV. On some Fijian <i>Psyllulæ</i> (Homoptera). By F. LAING, M.A., B.Sc. ....	553
LXV. Coleoptera of the Mt. Everest Expedition, 1921. By K. G. BLAIR, B.Sc., F.E.S. ....	558
LXVI. The <i>Mordellidæ</i> of the Fiji Islands. By K. G. BLAIR, B.Sc., F.E.S. ....	562
LXVII. Two new African Hispid Beetles. By S. MAULIK ....	569
LXVIII. The S. African Species of <i>Attalus</i> , Er., and some allied Forms [Coleoptera]. By G. C. CHAMPION, F.Z.S. ....	570
LXIX. On a new Toad, <i>Cophophryne alticola</i> , collected on the Mt. Everest Reconnaissance Expedition, 1921. By JOAN B. PROCTER, F.Z.S. ....	583



	Page
LXX. Nouvelles Observations sur quelques Echinides néogènes de l'île d'Anguilla. Par JULES LAMBERT (Troyes). (Plate IX.) . . . .	587
LXXI. <i>Galoncus tridentatus</i> , sp. n., a new Ankylostome living in fibrous Nodules in the Intestine of a Leopard. By M. KHALIL. . . .	596
LXXII. A new Davaineid Cestode— <i>Raillietina (Paraonella) macropa</i> , sp. n., from a Wallaby. By R. J. ORTLIPP, M.A., Parasitologist to the Zoological Society of London . . . . .	602
LXXIII. On a Hermaphrodite Specimen of <i>Amphioxus</i> . By W. RIDDELL, M.A. . . . .	613
LXXIV. <i>Metamynodon bugtiensis</i> , sp. n., from the Dera Bugti Deposits of Baluchistan.—Preliminary Notice. By C. FORSTER COOPER, M.A., Superintendent of the University Museum of Zoology, Cambridge . . . . .	617
LXXV. Some Remarks about Eastern Hedgehogs. By EINAR LONNBERG, F.M.Z.S. &c. . . . .	620
Proceedings of the Geological Society. . . . .	620-632

## NUMBER 54.

LXXVI. Descriptions of new Species of <i>Staphylinidae</i> from the West Indies. By MALCOLM CAMERON, M.B., R.N., F.E.S.—Part II. . . . .	633
LXXVII. The "Cirripede" <i>Lepidocoleus</i> in the Upper Ordovician Rocks of Scotland. By THOMAS H. WITHERS, F.G.S. (Plate X. figs. 1-5.) . . . . .	653
LXXVIII. An exceptionally complete Example of the Cirripede <i>Scalpellum fossula</i> , Darwin. By THOMAS H. WITHERS, F.G.S. (Plate X. fig. 6.) . . . . .	656
LXXIX. The Holotype of the Cirripede <i>Scalpellum angustum</i> (Dixon). By THOMAS H. WITHERS, F.G.S. (Plate X. figs. 7, 8.) . . . .	657
LXXX. Descriptions and Records of Bees.—XCIV. By T. D. A. COCKERELL, University of Colorado . . . . .	660
LXXXI. On a new Form of <i>Epinephale</i> from Cyrenaica. By Lord ROTHCHILD, F.R.S. . . . .	668
LXXXII. On Mammals collected by C. Keysser in the Saruwaged and Rawlinson Mountains Region of N.E. New Guinea. By OLDFIELD THOMAS . . . . .	669
LXXXIII. The Generic Name of the Finless-backed Porpoise, formerly known as <i>Neomeris phocaenoides</i> . By OLDFIELD THOMAS . . . .	676
LXXXIV. The Bandicoots of Nuyts Archipelago, S. Australia, and of Cape York, N. Queensland. By OLDFIELD THOMAS . . . . .	677
LXXXV. Two new Subspecies of <i>Phalanger orientalis</i> . By OLDFIELD THOMAS . . . . .	680
LXXXVI. A new Rock-Wallaby ( <i>Petrogale</i> ) from the Islands off South Australia. By OLDFIELD THOMAS . . . . .	681

	Page
LXXXVII. A Preliminary Note on Two <i>Strongylata</i> from Swine in the Pacific. By CLAYTON LANE .....	683
LXXXVIII. Description of a new <i>Typhlops</i> from Tanganyika Territory. By JOAN B. PROCTER, F.Z.S. ....	685
LXXXIX. Four new Fishes from Tanganyika Territory. By J. R. NORMAN.....	686
<i>New Books</i> :—Monograph of the Lacertidæ. By G. A. BOTLENGER, F.R.S. Vol. II. ....	689
The Complete Nature Book. a complete Handbook and Guide to British Nature Study, embracing the Mammals, Birds, Reptiles, Fish, Insects, Plants, etc., in the United Kingdom. By S. N. SEDGWICK .....	ib.
Proceedings of the Geological Society.....	690-692
A Correction, by Lord Rothschild, F.R.S.....	692
Index .....	693

# PLATES IN VOL. IX.

- PLATE I. Fauveliopsis and Eumenia caulleryi.  
 II. Fauveliopsis, Melinna, and Phascolosoma.  
 III. Brada, Trophonia, &c.  
 IV. Castmineæ in the Collection of Madame Gaston Fournier  
 V. Scalpellum (Cretiscalpellum).  
 VI. Deuterophlebia mirabilis.  
 VII. New species of Alcides from the Oriental Region.  
 VIII. New African Cetoniine beetles.  
 IX. Neogene Echinoids from the Island of Anguilla.  
 X. Lepidocoleus and Scalpellum (Arcoscalpellum).

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[NINTII SERIES.]

“..... per litora spargite museum,  
 Naiades, et circum viâ eos considite fontes:  
 Pollice virgineo teneros hinc capite flores  
 Floribus et pictum divæ, replete canistum.  
 At vos o Nymphæ Cnaterides, ite sub undas,  
 Itte, re urinato variata corallia trunco  
 Voluit muscosis erumpibus, et nudi conchas  
 Ferte, Deæ pelagi, et pingui conchyliâ succo.”  
*N. Partheni Guannettæ, l. l. 1.*

No. 49. JANUARY 1922.

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I.—*Notes from the Gatty Marine Laboratory, St. Andrews.*  
 —No. XLIV. By Prof. MINTOSH, M.D., LL.D., D.Sc.,  
 F.R.S., &c.

[Plates I.—III.]

1. On new and rare *Polychæta*, *Gephyrea*, etc., from various Regions.
2. Recent Additions to the British Marine *Polychæta* (*continued*).

1. *On new and rare Polychæta, Gephyrea, etc.,  
 from various Regions.*

OF the pelagic forms related to the Phyllodocidæ Mr. Southern has added to the British Fauna *Maupasia caca*, Vignier, which has a head with slender tentacles and two pairs of tentacular cirri of equal length. The foot is short and blunt, the dorsal and ventral cirri projecting beyond the tip. The dorsal cirrus is foliaceous, the ventral long and slender. The bristles are more slender and elongate than those of the type, and the terminal piece rests on a process considerably within the tip of the shaft, which is pointed. The terminal piece is very slender. It

occurred in a tow-net at 111 fathoms off the West Coast of Ireland (*Southern*). Another addition is *Haliplenes mayana*, Southern, from the same region, a pelagic form in which the head is rounded in front; dorsal tentacles as long as the head is wide, and slightly larger than the ventral pair, which are placed far back, just in front of the mouth. At the base of the head dorsally is a wide collar, projecting laterally, and continued on the ventral side behind the mouth. No eyes. Body 3.6 mm. long; segments thirty-five; width across the feet 1 mm. Colour in spirit pale yellowish brown. Foot with the pointed setigerous lobe projecting beyond the cirri and the tip of the spine is just visible. The dorsal cirrus is pear-shaped, the ventral bluntly conical. Bristles with slightly curved shafts and a prominent process at the tip. The terminal piece is long and slender, two to three times as long as the free portion of the shaft (*Southern*).

A third pelagic type is *Lopadorhynchus appendiculatus*, Southern, procured off the West Coast of Ireland in the tow-net over 450 fathoms. The dorsal tentacles on the head are twice as long as the ventral, which are not seen from the dorsum. The ventral tentacular cirri are somewhat longer than the dorsal, and on the basal piece of the ventral is a rudiment of the third pair. Body 13 mm. long and 5 mm. wide, narrowed posteriorly; segments twenty-three, of which twenty-two are setigerous. Dorsally each segment is marked by a transverse ridge running along the middle, so as to have lozenge-shaped depressions in each intersegmental area, and ridges also occur ventrally. Feet anteriorly modified, but the typical foot occurs at the seventh, which has a pointed setigerous lobe with a spine and a rounded setigerous lamella with seventy-six compound bristles. The dorsal cirrus is conical and larger than the ventral, the tips of both being within that of the setigerous lobe. The ventral cirrus has a filiform process at the tip and the aperture of a multicellular gland near its base. Small granules of dark purple pigment occur on the inner sides of the cirri.

The same form was described by Prof. Fauvel as *L. uncinatus* a few years later, and he emphasized the presence of the hooked bristles in the first two feet by his title to the species.

*Eumenia hystricis*, sp. n.

Dredged on the Channel slope at Station 8, 'Porcupine' Expedition, 1870, at a depth of 257-690 fathoms amidst a fauna chiefly northern.

A fragment devoid of the anterior region, resembling a curved larva of an insect, of a rounded form and apparently thickest posteriorly, for it tapers anteriorly, where the segments are longer, and closely ringed throughout the rest of its extent. Each segment bears two short gills, thus differing from *Eumenia crassa* or *E. jeffreysii*, and they are longest behind the middle and diminish in the caudal region. They spring apparently from the posterior edge of each segment-junction, and generally in the preparation present a somewhat club-shaped outline (Pl. I. fig. 3) with a firm cuticular investment having a finely granular hypoderm beneath. They are marked by transverse striae, probably due to the circular fibres, whilst internally is a large blood-vessel which may form a loop distally, though the state of the specimen rendered this uncertain. Some of the gills contained large granular cells, but the nature of these has not been ascertained.

The segments (Pl. II. fig. 9) are simple—that is, without rings,—each dorsally slightly overlapping the anterior edge of the succeeding segment, and from the curve of the body the dorsal antero-posterior diameter is wide, the ventral narrow. The posterior segments become increasingly narrow and terminate in the anus, which has beneath it two papillae. The dorsal surface of the body is convex, the ventral presents a slightly flattened surface with a shallow groove posteriorly. The cuticle, moreover, by dipping in formed a series of reticulations, which here and there were arranged in long rows.

A remarkable feature was the apparent absence of bristles, no trace of which was observed until the fragments were put in xylol, when a vertical row of minute points—apparently the bases of bristles, though at first sight resembling minute uncini—was observed. The arrangement of the gills at once distinguishes this species from *Eumenia crassa*, CErst., and *E. jeffreysii*, M'L.

*Eumenia caulleryi* \*, sp. n.

Dredged in an inland sea in Japan, lat. 33° 48' N. and long. 133° 19' E., in 26 fathoms, in 1874, by Capt. St. John, and kindly forwarded by the late Dr. Gwyn Jeffreys.

Two complete examples resembling *Eumenia crassa*, CErst., in general appearance, but which had been rendered horny by drying, were obtained, the ends especially suffering from

\* Named after Prof. Maurice Caullery, of the Sorbonne, Paris, a distinguished investigator of the Polychaets.

the desiccation. What appeared to be the anterior end presented two rounded processes with a slit (mouth?) between them. This area was followed by six or seven narrow rings, each increasing on its predecessor. Behind these the segments were wider, and by-and-by showed two rings. The body seemed to be somewhat fusiform in outline, diminishing at each end, the posterior region presenting narrower rings. A groove occurred on each side anteriorly and probably continued to the posterior region, but the condition of the examples rendered this ambiguous. In this groove were the branchiæ, which appeared to extend almost from end to end, arising in front of the bristle-tufts and forming clavate organs (in the dried condition) of some length. The state of the specimen precluded absolute accuracy in this respect, and also as to whether some may have been bifid. They sprang from the anterior edge of the fold of the segment somewhat below the bristle-tufts. The entire surface of the body was covered with a tough (almost chitinous) cuticle minutely reticulated, so that under a lens it resembled very fine shagreen. Under the microscope rounded areas with a definite rim appeared.

The pale golden bristles formed two separate tufts in each segment, the dorsal consisting of long, tapering, simple bristles (Pl. I. fig. 2) similar to those in *Eumenia crassa*, but having no bifid spinous forms amongst them.

The ventral tuft, again, has long bristles (Pl. I. fig. 1) and the tip (Pl. III. fig. 6) of similar shape, but closely spinous throughout the distal third or more. When covered with débris or the crystalline rods found in old spirit-preparations, these spines may be overlooked, though it was the regularity of the crystalline rods which at first directed attention to these spikes.

So far as known no *Eumenia* or *Lipobranchus* presents the features of this species, simple bristles finely tapered at the tip and shorter bifid spinous bristles characterising the known forms. Moreover, the presence of branchiæ throughout the body is another feature of moment, and in this it agrees with *E. hystrix*.

#### Genus FAUVELIOPSIS, nov.

Prostomium rudimentary; cephalic region blunt, with bristles on each side. Body definitely segmented, divisible into anterior, middle, and posterior regions and grooved ventrally. Dorsal and ventral bristles with a pear-shaped papilla between them. The stouter anterior bristles present a terminal hook.

*Fauveliopsis* \* *challengeriae*, sp. n.

A remarkable form dredged by the 'Challenger' at Station 157 on the 3rd March, 1874, at a depth of 1950 fathoms, presents features which appear to be unique in the Polychaets. It occupied a hard brownish tube with black grains. The region in which it was found had a bottom of Diatom ooze, and was characterised by such rare forms as *Trophonia wyvillei*, M'I., *Pista abyssicola*, M'I., the neighbouring area harbouring the equally rare *Ephesia antarctica*, M'I., *Grubianella antarctica*, M'I., and *Leæna antarctica*, M'I., all dwelling in the Diatom ooze.

The specimen (Pl. II. figs. 1, 2, & 3) measures 17 mm. in length, and is rounded, with a pale iridescent cuticle, the marked annulation in front giving it some resemblance to a small earthworm, though posteriorly the imperfect preservation and partial collapse give a different aspect. The anterior end is slightly bulbous with a ventral flexure, and presents lateral bristles almost to the tip. The prostomium appears to be rudimentary, and is indistinguishable in the specimen; the flattened ventral eminences on each side of the mouth are probably related to the peristomium. Dorsally the anterior margin is rounded, but ventrally the two flattened eminences probably represent the palpi, the fissure between them leading apparently to the mouth. The outline of the anterior region dorsally is somewhat ovoid (Pl. II. fig. 4), and a constriction occurs behind the first bristle-tuft. The outline then enlarges to the median region and again slightly diminishes posteriorly, where it ends in two acutely pointed papillæ—after the manner of some *Protodrili*. The tissues, however, in this region are pulpy. The body is very definitely segmented, five bristle-tufts occurring in the ovoid anterior region, then follows a narrow segment with a much longer antero-posterior diameter, succeeded by others which gradually widen transversely, the last diminishing also in antero-posterior diameter. Next come two well-marked narrower segments, likewise wide transversely, after which a series of less distinct segments more than twenty in number go to the posterior end.

Dorsally (Pl. II. fig. 1) the surface is smoothly rounded, but ventrally (Pl. II. fig. 2) a median groove—commencing at the mouth—runs backward until it is lost in the softened posterior region. Laterally the body (Pl. II. fig. 3) is marked by transversely elongated lozenge-shaped areas

\* Named in honour of Prof. Fauvel, of Angers, who for many years has successfully laboured at the Polychaets.

between the bristle-tufts. Through the translucent posterior region a moniliform alimentary canal passes backward to the fissure between the caudal cones.

The bristles, of which there are about thirty-three pairs on each side, are pale, though in the sun they sparkle with metallic lustre, and are all directed forward—a feature most boldly marked in the longer anterior forms, which, moreover, are arranged in a dorsal and a ventral tuft. The first bristles are close to the small median cephalic area, and consist of a dorsal and a ventral series, with a clavate or pear-shaped papilla (Pl. I. fig. 8) between them. Each has three strong curved bristles, the stoutest with a terminal curve or hook directed outward (Pl. II. fig. 5 and Pl. III. fig. 2) and two or three others (Pl. I. fig. 7) more or less hooked, but differently from the former, so that they present irregularity in this respect. The first five feet have the strongest bristles, those which follow have longer bristles without a hook at the tip, though slightly curved. The posterior bristles (Pl. II. fig. 6) are shorter and more slender.

The accompanying tube (Pl. II. figs. 7 & 8) is firm and hard, composed of brownish grains of sand, dotted all over with black particles. It is somewhat rough externally, but perfectly smooth internally, the mucoid lining presenting a finely granular aspect with broken fibres and reticulated structures like the tests of Diatoms and Radiolarians. The innumerable broken fibres may be connected with *Rhizosolenia*. Such may have readily collected on the mucoid surface during the feeding of the animal.

The strong simple bristles of this peculiar form recall those of the Oligochaets or the anterior bristles of *Sclerocheilus*—indeed, the Scalibragmidæ are characterised by the simplicity of their bristles and the reduction of the prostomium; but their outline differs much from that of *Fauvelopsis*, and they do not dwell in tubes. The bristles of this new species offer, both in their structure and distribution, a rare condition in the Polychaets. The strongly hooked anterior forms are evidently fitted for action in the soft ooze, the more slender types posteriorly probably being useful during the movements in the tube. Bereft of tentacles, as in *Myriochele*, another deep-sea form, both are tubicolar. The mouth-parts are akin to those of *Brada*, and the anterior segmentation is as distinct as that of the posterior region in *Trophonia glauca*, M'grr., whilst the brittle refractive bristles approach those of this family (Chloræmidæ) in general structure, though not transversely striated. Whilst it bears certain



resemblances in the body and posterior bristles to *Sagitella opaca*, Ehlers \*, one of the Typhloscolecidae, it differs wholly in the cephalic region and other respects. On the whole, *Fauveliopsis* appears to approach the Chloræmidæ.

*Brada gravieri*, sp. n.

Trawled by the 'Challenger' at Station 158, considerably south of Australia, lat. 50° 1' S., long. 123° 4' E., in *Globigerina* ooze, along with *Hyalinæcia benthaliana* and *Grubianella antarctica*, var. A small, somewhat elongate-ovoid annelid, 5 mm. long by 2 mm. at its widest part (Pl. I. fig. 4), the surface of which was uniformly covered with a whitish coating like down, but on examination this was found to be a calcareous powder with fragments, often rounded, of *Globigerina* on the papillæ of the surface, and which partly fell off when touched, leaving a white powder on the bottom of the vessel. The entire annelid, both dorsally and ventrally, was thus coated, with the exception of the extruded proboscis. The extension of the continuous and dense villous coating, ventrally as well as dorsally, distinguishes it from *B. villosa*, Rathke, from which it also differs in shape. The entire surface is coated with extremely long slender papillæ, far exceeding proportionally anything hitherto known in the group, and in this tangled web the calcareous ooze lodges, besides coating the papillæ with minute granules. So far as could be observed, they seemed to be simple filamentous papillæ without special differentiation at the top—that is, without a terminal dilatation. The muscles of the body-wall, both circular and longitudinal, are well developed.

As far as could be ascertained, the dorsal bristles consisted of a minute tuft (Pl. I. fig. 5) of translucent finely tapered bristles, the tips of which were apt to bend; these had the usual muscular fasciculi at their bases. Their minute size is in bold contrast with the ventral series, most of which had been broken. These consisted of proportionally large, straight, translucent bristles (Pl. I. fig. 6 and Pl. III. fig. 1, tip), which when entire must have projected considerably on each side of the annelid, and may have supported it in the soft *Globigerina*-ooze, if they did not aid in progression. They are thin-walled and in the preparation showed a ridge, apparently from collapse. Their diameter at the widest part exceeded that of the long slender papillæ. No trace of the transverse marks, so characteristic of the bristles of the

\* Deut. Sud-Pol. Exped. 1901-3, p. 529, pl. xxxix. figs. 16 & 17.

Chlorœmidæ, was observed in either dorsal or ventral tufts, and their thin-walled condition is noteworthy.

*Trophonia sarsi*, sp. n.

Dredged by the 'Challenger' at Station 156, near the Antarctic Sea, 26th February, 1874, lat. 62° 26', long. 95° 44', at a depth of 1975 fathoms in Diatom ooze. This form is one (of not a few examples of the Polychæts) in this great Expedition which has apparently not come under the specific instructions for the preservation of marine Invertebrates, since only fragments of skin, a piece containing several pulpy segments, pieces of the intestinal canal, and the proboscis indicated the specimen. Thus it was put aside for greater leisure than could be afforded for the preparation of the 'Challenger,' vol. xii. It seems to have been an annelid of some size, probably 2 inches or more in length, and with a breadth at least of 3 to 4 mm., the skin at the feet bearing numerous long clavate papillæ with slender stems ending in bulbous tips, and the body appears to have been more or less flattened posteriorly. So far as can be ascertained from the pulpy fragments, it seems to be a Chlorœmid, but diverges in several particulars from any known form.

As only fragments of skin and loose bristles or separated groups of bristles were available, it was not easy to apportion these to their respective sites—indeed, a certain ambiguity still remains in this connection. It is not possible to say whether the longer anterior bristles formed a cage as in *Trophonia plumosa* and allied forms, as nothing in the preparation indicated such. What appeared to be dorsal tufts consisted of somewhat slender, smooth, translucent bristles (Pl. III. fig. 3), tapering from the base almost immediately to a long, fine, hair-like point. The inferior division of the foot contains no less than three kinds of bristles. The most conspicuous is a group of much elongated, slightly golden bristles (Pl. III. fig. 4 a) with thin walls like those of *Brada gravieri* which stretch far outward from the foot, and which are easily bent and broken like those of the species just mentioned. The base is broad and apparently flattened, and they taper almost from this distally and end in a delicately tapered point. Some isolated bristles of this kind were much larger and longer than the example sketched, but the region to which they belonged could not be ascertained. The largest, like those of *Brada gravieri*, were apt to collapse in Farrant's solution and present a keel. Some

were shorter, with broader bases and more rapidly tapered tips (Pl. III. fig. 4*b*).

The second kind of bristles are long, straight, and more slender (Pl. III. figs. 5 & 6), more needle-like in shape, and minutely serrated throughout the distal half, the basal region being smooth and translucent, the tip finely tapered and devoid of spikes. The latter are apparently whorled, and thus slightly oblique lines cross the bristle. This marked differentiation of the tip is rare in the Polychaets, the serrations, as a rule, gradually becoming less and less and finally disappearing. Here the transition is abrupt. The third kind of bristles are remarkable in a Chlorœmid, for they are large, translucent, thin-walled bristles, quite visible to the naked eye, curved at the tip and ending in a blunt hook with a secondary process beneath, as in certain Polynoidæ, Sigalionidæ, and *Macrochæta*, whilst the convex outline is double (showing that the tissue is here thicker) and very minutely serrated (Pl. III. figs. 7 & 8). The double contour of the serrated or convex edge indicates a thicker wall. A developing tip or two generally occur in the tuft, the bifid tip and a short portion of the shaft being present.

The separated proboscis is a cup-shaped muscular organ, and like the gut was filled with whitish ooze crowded with tests of Diatoms, spicules of sponges, and a few Radiolarians.

*Melinna buskii* \*, sp. n.

A pulpy and fragmentary *Melinna* was dredged by the 'Challenger' at Station 157, on March 3rd, 1874, in 1950 fathoms, in the midst of the Diatom ooze, considerably south of Australia—a region, indeed, conspicuous for its novelties. Unfortunately, its condition was so unpromising that it was put aside during the pressure of the 'Challenger' work.

The anterior region in the softened example had lost its branchiæ, and only shreds of the tentacles remained. It is uncertain whether the free dorsal rim of the fourth segment had other than the smooth edge it now shows. The number of the bristle-tufts is probably seventeen, though only fourteen or fifteen could be seen, as the body was in two pieces and part absent. The bristles are powerful golden structures, tapering distally, with narrow wings and standing prominently on setigerous processes.

Posteriorly the body tapers a little and ends in an anus

\* Named after the late distinguished zoologist, Prof. G. Busk.

with two long slender cirri. The sides have a series of somewhat slender lamellæ for the hooks.

The hooks (Pl. II. fig. 19) differ from any form described, the outline being triangular with a straight posterior border ending inferiorly in a process (probably for a ligament) and a gently curved base. The anterior edge has five teeth, which increase in size from above downward, the gulf below the last being rather small, and the prow has an oblique front edge giving it a somewhat truncated appearance. Their general shape agrees with that of *Melinna cristata*, though the straight posterior outline, the number of teeth, and the shape of the prow diverge.

The tube is soft (woolly in aspect), tears like soaked cotton, and is made up of a vast series of minute Diatoms, slender sponge-spicules, a few Radiolarians bound in a mass by the secretion of the annelid, not as usual in definite internal and external layers, but forming a cotton-like mass of a certain toughness.

A fragmentary Oligochæt, *Hemitubifex benedeni*\*, Beddard (*Clitellio ater*, Claparède), was procured between tide-marks at the East Rocks, St. Andrews, in 1863, the entire surface of which was densely covered with greenish papillæ, but only the posterior region was secured. Each segment has a slender tapering bristle and a stouter simple crotchet, hooked and tapered at the tip (Pl. I. fig. 9). In the preparation the posterior concavity of the hook is directed forward, and anteriorly the crotchets are less curved, as shown by comparing a posterior crotchet (Pl. I. fig. 10) with the foregoing (fig. 9). When magnified (350) the surface of the cuticle resembles shagreen from the dense coating of the greenish papillæ. The posterior region is tapered toward the tail, and this region has numerous thecate Infusoria of an elongate vase-shape attached by a pedicle. Such would indicate that the tail is more or less free, as in the case of *Tubifex rivulorum*. I am indebted to Dr. Beddard for identifying this form and aiding me with references.

Dalzell † describes *Lumbricus hirsutus* as covered with hairs, from the coast of Fife, with a pencil of bristles in each segment, but this differs in colour, the anterior region being whitish and the posterior dull red or umber.

\* Monogr. Oligochæt. p. 261 ; see also Proc. Zool. Soc. 1888, p. 485.

† Pow. Creat. vol. ii. p. 140.

*Gephyrean? A.* In a tow-net at 300 fathoms, during the work of the 'Triton,' on the 20th August, 1882, a minute, badly preserved form occurred in the débris. Little more could be made out of the specimen than that it was a minute slender annelid in a pulpy condition, yet at one end it presented under the microscope two groups of remarkable bristles, unknown in the history of the Polychæta, so far as can be ascertained. These consisted of comparatively large curved bristles (Pl. III. fig. 9), one end terminating in a blunt point, the other gradually dilating into a broad blade with an oblique base, the dilated region which appears to be thin having a series of oblique striae, which in some views simulate fibres. These bristles are evidently hollow, with comparatively thin walls, especially at the base, and the membranous central region may readily be thrown into striae by the solution. The convex outline presents a double margin, as if the chitinous tissue were thicker there.

The structure of these bristles is peculiar, and it may be they belong to the *Gephyrea*, though the minute and elongated outline resembles that of an Oligochaete. The condition of the specimen, however, is most imperfect. Before mounting in Farran's solution it was thought that somewhat triangular, diaphanous hooks appeared in the softened tissues, but none could be detected thereafter. One hooked bristle, however, was observed (Pl. III. fig. 10), with the same thin shaft as the larger bristles figured, but a peculiar separation or modification of the inner layer of the bristle appears to have taken place near the tip, the central axis remaining entire. Such a type of bristle has no connection with the large forms with the expanded bases. All are exceedingly diaphanous. These brief notes may be sufficient for the identification of the form by subsequent observers.

Another peculiar form, apparently Gephyrean, and which may be termed *Phascolosoma lankesteri*\*, was dredged in the 'Porcupine' Expedition of 1870, in 60–160 fathoms, east of Cape de Gatte. It inhabited a clear soft tube resembling that of *Placostegus*. It is a small form (Pl. II. fig. 11), barely half an inch in length, of a pale yellowish colour, nearly cylindrical in outline, but having a long process, widened at its extremity anteriorly, whilst posteriorly it is rounded and papillose. On each side of the base of the long

\* In honour of my old and distinguished friend Sir E. Ray Lankester, K.C.B. The *Phascolosoma ohlini* of Thiel (Swedish Antarctic Exped. 1911, p. 29) presents similar papillae posteriorly, but differs in other respects.

anterior process is a tuft of translucent bristle-like fibres, probably caused by rupture. The free extremity of the elongated anterior process presents an irregular edge from low papillæ, but whether it represents an introvert can only be conjectured. At its base is an elongated and apparently tubular structure, which may have issued from the body at the bristle-like fibres. In certain views (Pl. III. fig. 11) the basal region of the long anterior process is asymmetrical, probably when seen laterally. No fold or break occurs in the outline as the process leaves the body, and its sides are perfectly smooth. The widest part is at the base, as shown in the figure; it then is nearly cylindrical for some distance, and again slightly widens as it approaches the bulbous end, which in the position occupied in the figure is not quite symmetrical. So far as observed, only longitudinal muscular fibres are present in the process, and the cuticle must be extremely thin as there is no sign of it laterally. In the centre of the process is a granular tube occupying more than half its diameter.

The body is invested by a tough cuticle, with papillæ here and there and the group already mentioned at the posterior end (Pl. II. fig. 12). The circular fibres beneath are fairly developed throughout and the longitudinal layer is powerful. Enclosed in the body-cavity were many ova of various sizes, the smallest presenting the appearance of naked granular cells with a large nucleus and nucleolus, the larger having a tough, apparently chitinous capsule. The bristle-like fibres of the anterior end seem to have been due to rupture and the spreading out of the stiff tapering muscular fibres.

## 2. *Recent Additions to the British Marine Polychæta* (continued).

In 1908\* it was stated that no member of the Alcïopidæ had yet been met with in British waters, but there was no reason why such should not be found, *e. g.*, "off the southern shores of England and the West Coast of Ireland." The skill and perseverance of those on board the Irish Fisheries' ship 'Helga,' indeed, shortly afterwards added no less than five species to the British Fauna from the surface of the deep water off the West Coast of Ireland. It was Greef who first in modern times brought the group into notice, and he was followed by Hering. Both divided the Alcïopidæ into two main groups, the former using the head, feet, bristles, and proboscis as the leading features of distinction,

\* 'Monograph,' vol. ii. part i. p. 112.

the latter the colour, the tentacles and cirri, the head, feet, and their appendages as the bases for classification. Apstein, again, forms his two main groups on the structure of the bristles, subdividing by aid of the structure of the feet into eight genera, viz.: *Alciopa*, *Asterope*, *Vanadis*, *Greefia*, *Callizonella*, *Corynocephalus*, *Rhynchonerella*, and *Callizona*. It is noteworthy that almost all were found either over or in the midst of very deep water, probably in the line of the Gulf Stream. The group is closely allied to the Phyllodocidæ, and some make it a subfamily of the latter.

The first of these is *Vanadis formosa*, Claparède, a comparatively large species measuring 30 cm. in length, with a breadth of 5 mm. and two hundred and twenty segments. Female with four seminal pouches. It was procured on the West Coast of Ireland in the mid-water trawl in deep water, though also in 5 fathoms (*Southern*). The second is *Greefia reynaudi*, Audouin & Edwards, also a widely distributed form in the great oceans. It occurred both in mid-water and at the surface over great depths. The third is *Callizona angelini*, Kinberg, procured in the tow-net near great depths. *Southern* identifies this form with *C. grubei*. The fourth is *Callizona setosa*, Greef, captured at the surface near a depth of 480 fathoms. The fifth is *Callizona nasula*, Greef, obtained in the mid-water trawl between 600 and 700 fathoms.

In the family of the Eunicidæ *Marphysa fallax*, Marion & Bobretzky, was found under a stone at Bananagh, Blacksod Bay (*Southern*). Elsewhere it occurs at Marseilles (*Marion & Bobretzky*); Dinard, France (*De St. Joseph*). Marion and Bobretzky observe that the compound bristles with the bifid tips differ from those of *M. sanguinea*, and that the dental apparatus also diverges from that of the latter species, in so far as six denticulations occur on the maxillæ. *Southern* notes four ventral cirri on the anal segment and three spines in the ventral division of the foot. *De St. Joseph* found his examples in the dredge, and with a coloration approaching that of *Lysidice ninetta*. They were small, viz., 15 mm. in length. Its bristles resemble those of *Marphysa belli*, but it differs in regard to the branchiæ and in the form of the head.

*Armandia flagellifera*, one of the Opheliidæ, was captured in a tow-net at night near the entrance to Ballynakill Harbour; dredged in 11 fathoms in mud, Galway Bay

(*Southern*). The *cephalic* region tapers to a slender point, which does not show a clavate tip. The extruded proboscis is furnished with thirteen slender papillae (*Southern*). Nuchal organ conspicuous on each side in the front of the first bristle-bundle. The *body* is fully 12 mm. long, tapered at both ends, but nearly of uniform diameter throughout the rest of its extent. It is rounded dorsally, deeply grooved ventrally from the snout to the anal funnel. Setigerous segments thirty-three, each with three rings, and each ring biannulate (*Southern*). The dorsal cirri are filiform and fairly long. An eye-speck is situated behind each foot, from the fourth to the nineteenth, and each consists of small spheres of pigment or a single mass (*Southern*). In lateral view the body abruptly narrows to the anal funnel, which is a flattened tube with a dorsal opening posteriorly. The margin of the funnel is papillose posteriorly, *Southern* describing the opening as projecting in four lobes, each bearing a fusiform papilla. A long slender cirrus, nearly twice as long as the anal funnel, arises from the ventral base in front of the funnel.

The feet occupy the upper and outer border of the ridges made by the ventral longitudinal muscles. The setigerous lobe is rounded, and bears superiorly the long subulate cirrus in which at least one blood-vessel is present, then a tuft of simple capillary bristles; ventrally a similar tuft of bristles and a small, somewhat clavate, ventral cirrus (*Southern*).

In the Scalibregmidæ *Asclerocheilus intermedius*, De St. Joseph, was dredged by *Southern* in Blacksod Bay and other places on the West Coast of Ireland. It is a small species, measuring about 2 or 3 mm., the anterior end being distinguished by two rounded processes with a depression between. The body is somewhat fusiform in outline, slightly tapered anteriorly and abruptly so posteriorly. Body apparently has about twenty segments. So far as seen, no ventral cirrus is present and no eyes\*. The ventral hooks of the second segment have a marked curve backward (sickle-like) at the tip, and terminate in sharp, not attenuate, points. The upper bristles of the second segment are capillary, with finely tapered, long points. The posterior bristles are more elongate. Apparently transverse rows of opaque glands occur posteriorly in each segment.

\* The eyes are probably deep-seated, as in *S. minutus*. Vide the elaborate research by A. and L. Dehorne, Arch. Zool. Exper. t. lili. no 61-137. pls. iv.-vii. (1913).



*Sphærodorum claparedi*, Greef, and *S. minutum*, Webster & Benedict, examples of the Sphærodoridæ, come also from the West Coast of Ireland (*Southern*). The former appears to be so closely allied to *S. minutum* that hesitation is felt in separating them. The bristles of this and *S. minutum* differ very little, and the only other feature which was noticed was the more regular arrangement and size of the papillæ in *S. minutum*. *S. claparedi* may be a young form developing reproductive elements. The material at hand, for which I have to thank Mr. Southern, did not suffice to afford a satisfactory conclusion, and, therefore, his description was alone available.

In the family of the Paraonidæ, Cerati, besides the *Aricidea gyffreysi*, McIntosh, already described, the *Paraonis* (*Aricidea*?) *lyra* of Southern has to be added, from the surface tow-net in Galway and Dingle Bays. The specimens range from 12–20 mm. and from ninety to one hundred and five bristled segments. In this the head is somewhat bluntly conical, with a low rounded papilla bearing stiff cilia on the tip, and having yellowish pigment. Nuchal organs brownish, large and conspicuous, sloping obliquely backward and inward from the mid lateral region. Body widest in the middle, tapering toward each end, 20 mm. long, and with ninety-five to one hundred and five segments. Three anterior segments have capillary bristles and small dorsal cirri, but the latter gradually increase in size and are long and slender in the posterior segments. Anal segment rounded, with three slender subulate cirri—two dorso-lateral and one median ventral; a pair of cirri fixed to the anterior border, but may represent the last pair of dorsal cirri. Anteriorly the dorsal and ventral bristles are almost equal in length, and continue so to the posterior end in the immature, but in the mature male the ventral increase in length about the fifteenth to twentieth segment, whilst the dorsal become shorter. The bristles of the male are more prominent than in the female, exceeding the width of body, especially posteriorly. The dorsal cirri are placed behind the fascicle of bristles. Capillary bristles slender, devoid of wings, and the longer ventral bristles in the male are striated longitudinally. On the lower side of the front row of the dorsal tuft are one to three short bristles with lyrate tips, one end being longer than the other, and with a row of spines on its inner margin; this type commences in the fourth segment and continues to the tail. In the fourth foot the dorsal bristles are slightly longer than the ventral; in the fiftieth foot the ventral are thrice as long.

In the male the upper ventral bristles are longer and thicker, as well as longitudinally striated—a condition not present in the female. In the eightieth foot the differences between the dorsal and ventral bristles is less pronounced. Red ova appear in the female in the twentieth segment, usually four in each (*Southern*).

In the family of the Chætopteridæ it was mentioned that tubes of *Spiochætopterus typicus*, Sars, had been procured in St. Andrews Bay, and since in Loch Linnhe.

Each segment posteriorly in the sole imperfect example secured (Loch Linnhe) has dorsally a pair of setigerous processes bearing a group of about four bristles, with long shafts and flattened spear-like tips. Two flaps or lamellæ occur laterally below the foregoing, and bear very transparent hooks, the outline of which is somewhat triangular, with a round apex, a thickened anterior margin, which is probably minutely serrated, though in the preparations such was not seen, and ending inferiorly in a short main fang. The transparence of these organs renders it difficult to make out their outlines, and they escaped Sars.

*Phyllochætopterus anglicus*, Potts, was discovered by Mr. Potts at Plymouth in 1913, and though it presents close relationships with forms he had met with on the Pacific coast of Canada, and appears to be intermediate between *P. prolifera* and *P. socialis*, Clap., yet he considers that it merits specific distinction, not only because the tubes run parallel, and are not, as a rule, adherent, though connected, but for the morphological characters of the animal. Further investigations, however, in view of the cosmopolitan distribution of many similar forms, and the necessity of allowing a wide margin for variations, may tend to minimise the present differences shown in the careful and well-illustrated description of Potts.

The British species appears to live in water of some depth south of the Eddystone, and had been captured by trawlers.

In connection with the structure of the peristomial appendages, Potts considers that, since the second pair contain, as Claparède pointed out in *P. socialis*, a few slender capillary bristles, they may represent the modified dorsal division of the foot of the segment.

While giving a full description of the bristles, Potts does not give details of the minute hooks, which escaped both Sars and Grube. They are very minute translucent structures, somewhat conical in outline, with a long curved

anterior margin most minutely serrated, the serrations readily escaping detection even under high powers. The posterior border is concave, and the base is convex in front, concave posteriorly (O.G. curve).

Potts considers that the conical peristomium is primitive, and that the formation of the peristomial funnel is a direct adaptation to microphagous habits. The prostomium is a definite structure, but varies in the several species, being better developed in some than in others. It is better developed in *P. anglicus* than in *P. elioti*, Crossland, from Zanzibar.

In the Spionidæ, Southern found *Pygospio seticornis* (Cérsted) on the West Coast of Ireland, and observed that it differs from what he had described in the 'Proceedings of the Royal Irish Academy' as *Spio seticornis*, Fabricius, from Clare Island. In *Pygospio seticornis* the head is bluntly bifid, though when seen laterally it is conical. The branchiæ commence on the first or second segment, and are large about the twelfth or thirteenth. The tail ends in two larger and two small cirri, somewhat like *Pygospio elegans*; though in one example the four caudal cirri were about equal. What was sent as a young specimen presented only two ovate lobes at the tail. The anterior bristles are stouter and more boldly curved, with a scoop-shaped lamella in front of them, whilst those at the tail are as usual in the group and nearly straight. There are five or six tufts of these.

The hooded hooks commence on the seventh bristled segment, and are more boldly curved about the anterior third. There can be little doubt about Cérsted's form being a *Pygospio*. It is not the *Nereis seticornis* of O. Fabricius.

Cérsted describes the species as having two series of parallel eyes, the tentacles not alternate; the segments devoid of black pigment; ligulate branchiæ in the middle of the body, but diminishing and disappearing at either extremity.

This form closely resembles *Pygospio elegans*, Claparède, with the exception of the arrangement of the branchiæ, and has been a puzzle to many students of the group. It is in need of careful re-examination. Leschke gives an account of two stages of what he considers to be the pelagic larvæ, which occur likewise in British waters, though their identity has not been satisfactorily tested.

*Spio martinensis*, Mesnil, comes from Dublin, Clew, and Blacksod Bays, Ireland (*Southern*). This is a much larger

form than *Spio gattyi*, and the aspect differs. The head is characteristically trilobed, a rounded median lobe projecting in front and supported by two lateral lobes a little further back. Two eyes occur toward the posterior border of the head. In lateral view the snout is bluntly conical, the central or prostomial region being nail-like and the mouth opening a little behind the tip. A short median tentacle occurs on the prostomium and a brief ridge appears to be continued a short distance backward to end in a small process or tentacle. The body is slightly narrowed anteriorly, is more distinctly diminished posteriorly, and ends in four foliaceous lobes or cirri. It is flattened both dorsally and ventrally, the upper surface carrying the branchiæ and the ventral surface being marked anteriorly by lines of dark pigment on the terminal region behind the mouth, and with a dark line in the middle of each segment-junction for ten or twelve segments following.

The first segment bears a broad sabre-shaped branchia, which overlaps its fellow of the opposite side behind the snout. It has a single lobe, the longer margin being inferior, and a tuft of finely tapered bristles which show a narrow margin distally on each side. Above these is a shorter tuft, slightly differing in direction. The second foot has a similar ventral lobe, a tuft of curved bristles, and, in addition, a superior lobe confluent with the branchia and carrying a tuft of longer bristles, finely tapered, but less curved distally. At the tenth foot the ventral lamella is elongated vertically with its upper margin deepest, and separated by a narrow cleft from the dorsal, which fuses with the edge of the branchiæ—the whole forming a broad flat blade. The bristles have the same structure. At the twentieth foot the vertical elongation of the ventral lobe is marked, and the lower half bears a row of hooks, which have a bold curve at the junction of the shaft with the neck, then slightly diminishes upward to the main fang, which makes more than a right angle with the neck, is long and sharp, with a spike above it, and has a wing on each side. The upper dorsal bristles are longer and more slender. At the fortieth foot the branchia is shorter and broader, and the upper group of the bristles much elongated and very finely tapered. The ventral hooks are similar.

In 1896 Mesnil established the genus *Nerinides* for De St. Joseph's *Nerine longirostris*, in which the prostomium was without frontal processes. The branchiæ extended from the second setigerous segment, and these

were about the length of the dorsal lamellæ. There were no hooked bristles, and the ventral division of the foot has no hollow. An anal sucker. The first species is *Nerinides longirostris*, De Quatrefages, from Blacksod Bay (*Southern*).

The *head* is acutely pointed, with a median ridge, which runs backward to the third segment, on which four eyes in a square are placed, and the sides have a flattened process (peristomium), from which project a pair of short tentacles of a golden-yellow colour, and these when separated retain vitality for three days (*De St. Joseph*). Beneath them is a ciliated groove with pigment-granules, and possibly with urticating elements (*De St. Joseph*). The tentacles, as in allied forms, aid in procuring nourishment. *Body* 10 cm. long and 8 mm. broad, slightly tapered anteriorly, and more so posteriorly, where it ends in a dorsal anus with a multilobed ciliated border not surrounded by cirri. The colour is rose-red anteriorly (probably from the blood-vessels), but from the fortieth segment, or thereabout, the posterior region is dull green, almost blackish, but near the vent the intestine is yellowish, and is usually filled with *Rissoa parva*. The first segment carries a branchia, and has a dorsal and a ventral division with bristles. There are two lamellæ, the posterior larger than in *N. foliosa* and bordering the branchia. Behind the anterior lamella is a flattened disc with a tuft of bristles similar to the inferior lamella, but longer. From the thirty-third to the forty-fifth segment, according to the size of the individual, the inferior division bears two or three bifid and hooded hooks, which by-and-by increase in number to about twenty, and at the ventral border a few wingless capillary bristles. Simultaneously, the posterior lamella forms a margin only to the first part of the branchia, which also is smaller. The feebly winged bristles persist to the posterior end in the dorsal division, but without accompanying hooks. In the last twelve or thirteen segments the branchiæ progressively diminish and disappear.

Mesnil and Caullery\* (1917) describe this species as dimorphic, some eggs developing to typical Spionid larvæ, whilst others in the spawn-mass develop directly without a pelagic stage. Moreover, in the latter case cannibalism occurs, the authors assigning the title adelphophagy to the condition (the pocilogony of Giard). De St. Joseph met with *Trichodina pediculus* as a parasite on the branchiæ; whilst in the interior of the branchiæ and the tentacles he found

\* Compt. Rend. clxv. p. 281.

encysted Distomes, which might have been introduced by the *Rissoæ*.

The second species is *Nerinides tridentata*, Southern\*, from Blacksod Bay in Laminarian roots. The snout is pointed, with a median ridge which in lateral view forms two divisions—an anterior less elevated and a posterior terminating in the more or less adnate tentacle. In the line between the two divisions are the four black eyes arranged in a transverse row. The mouth opens inferiorly, and the extruded proboscis is bell-shaped and smooth. The tentacles were absent in the example kindly sent by Mr. Southern, but he describes them as "short, thick, and firmly adherent, of a deep chocolate colour."

The body is nearly an inch in length (16–20 mm.) in life, tapered a little in front and more distinctly diminished posteriorly, where it terminates in two small rounded lobes, a slight dorsal process indicating the upper edge of the anus. Segments 61–70 short anteriorly, wider in the middle region. Dorsal surface flattened, ventral rounded.

The first foot has a small conical papilla or cirrus, and a single (ventral) tuft of translucent bristles with a well-marked curve at the commencement of the tip. If wings are present they are very narrow. The second part bears dorsally a small branchia curved inward, the dorsal lamella being fused to it and ending inferiorly in a truncate edge. A tuft of finely tapered translucent bristles spreads like a fan upward and outward. The upper bristles of the tuft are longer and more delicately tapered, and the wings in these are less distinct than in the shorter and thicker forms at the lower edge. The inferior division has a bluntly rounded lamella and a shorter tuft of bristles with traces of wings. At the tenth foot the branchia is larger, forming a broad, flat, curved process, the soldered lamella of the superior lobe ending inferiorly in an edge which projects less than the upper margin of the ventral lamella. The dorsal tuft of bristles has the same structure as in the second, only they are in two rows, are longer and stronger, and the tips less elongated. The lamella of the inferior division has increased in depth, and the bristles are proportionally longer and still stouter than the dorsal. Both tufts have a distal curve. Southern describes a group of three slender striated setæ on the lower margin of the ventral bundle.

\* Proc. R. Irish Acad. vol. xxxi. No. 47, p. 98, pl. x. fig. 23 A–J.

Hooks appear in the ventral divisions of fifteenth to sixteenth foot. At the twentieth foot the branchia retains a similar shape and is still large, with the dorsal lamella on its outer edge. The bristles are similar to those in front. Ventrally the lamella has much increased in depth, and is separated only by a short gap from the dorsal, where its breadth is greatest, for it diminishes ventrally. From its lower edge fully half its border is occupied by hooks, which are closely arranged inferiorly, but have more space superiorly. The shaft of the hook dilates from the base upward to the bold forward curvature, when it slightly diminishes to the neck, from which the proportionally large main fang comes off at a little more than a right angle. A single spike (in lateral view) occurs on the crown. Distinct wings guard the tip of the hook, which is thus in reality hooded. The lamellæ of the feet are most prominent in the posterior part of the body, and thus differ from those of *N. longirostris*, and the latter lives in clean sand, whereas *N. tridentata* frequents Laminarian roots (*Southern*).

In the 'Annals and Magazine of Natural History,' ser. 8, vol. iii., February 1909\*, a form from the 'Porcupine' Expedition of 1869 was alluded to under the title of *Scolecoplepis* (I). This has now been definitely termed *S. lamellata*, with the following characters:—

Head with an even transverse margin in front, a short blunt tentacle at each angle, and from the centre a short elevated region proceeds backwards to end in a small process which is pointed posteriorly like an adherent tentacle. Minute eyes seem to be present on each side of the latter, but the condition of the specimen renders accurate determination uncertain. The whole region is short, and the proboscis is thrust out as a short cylinder with a crenate margin. Body fragmentary, flattened, slightly and abruptly tapered anteriorly, and with a median band ventrally. The segments are narrow and numerous. The first foot carries a subulate branchia and a large lanceolate lamella projecting freely upward nearly as far as the branchia. The latter remains subulate at the fiftieth foot. Dorsal bristles of the first foot slender, long, and finely tapered, and the ventral are also long and slender. Behind the tenth foot the bristles are similar and of a dull golden colour. The ventral bristles form two groups, viz., upper finely tapered forms and a lower series of shorter broader bristles overlapping the former,

and with acute tips. At the fiftieth foot a notch separates the two divisions, and the modified ventral bristles have a sharp and slightly hooked point minutely dotted under a high power.

This is a fragmentary form, yet with such definite characters as to render its identification easy.

The first foot carries a subulate branchia and a large lanceolate lamella. The ventral division also has a lanceolate process, and the bristles in both are long and slender. From the shape of the body the lamellæ and bristles occupy the dorso-lateral edge, so that the branchiæ, which readily fall off, pass transversely inward over the flattened dorsum. At the tenth foot the ventral lamella forms a broad, almost semicircular flap, with a tendency to a peak inferiorly. The ventral series of shorter broader bristles overlap the finely tapered forms stretching outward along the lamella.

The branchiæ remain subulate at the twenty-fifth foot, and stretch beyond the elongated upper lamella, which is acutely lanceolate superiorly, its outer edge being comparatively even till it curves inward inferiorly. The ventral lamella forms a blunt flap with the bristles in the groups just mentioned. At the fiftieth foot the branchia is still rather long and subulate, and the upper lamella is prominent and rounded inferiorly, whilst superiorly it is acutely lanceolate. The upper bristles of the dorsal series are long, slender, and finely tapered. A notch separates the two divisions of the foot. The ventral lamella is also prominent and rounded, generally with a short peak. The modified bristles ventrally show a sharp and slightly hooked point, minutely dotted under a high power. No wings are visible in either dorsal or ventral bristles.

A new British species is *Aonides paucibranchiata*, Southern\*, from Clew Bay and Berehaven. The snout is acute, though less abruptly so than in *A. oxycephala*, and it is prolonged backward to end in a peak. Four eyes occur posteriorly, the anterior pair having a larger space between them. The body, though much smaller, has a similar form to that of *A. oxycephala*, and it bears about ten gills anteriorly, the branchial region being thus different from that of the common form, in which the gills appear to be closer in the preparations, though that may be caused by the methods adopted in preservation. In the seventy-eighth foot the dorsal division contains four hooks and six capillary setæ.

\* Proc. R. I. Acad. vol. xxxi. No. 47, p. 100, pl. xi. fig. 24 A-E.



The ventral division has seven hooks and four capillary bristles, the two central being longer and stouter than the others. The lamellæ have long, finger-shaped, amber-coloured glands.

The tail of *A. oxycephala* in the examples from Herm is small, and has dorsally two short conical lobes, whilst beneath are about eight smaller conical cirri, whereas in this species there are but two pairs of anal cirri.

Besides the additional Spionids mentioned in the 'Annals' for January 1915, another form, viz., *Magelona rosea*, Moore, has been dredged by Mr. Southern in Killary Harbour in mud. In this the prostomium and peristomium are coalesced to form the broad ovoid head (in spirit), with dorsal cephalic ridges tapering to acute points, which diverge anteriorly. Peristomium with prominent lateral lobes; tentacular cirri arising laterally with papillæ, which increase in length distally. Proboscis soft, bulbous, with parallel striæ. Body slender, depressed, tapering and subquadrate anteriorly, 40 mm. long; segments about ninety-five. Ninth bristled segment with tapering simple bristles\*. Pygidium small, oblique, with anus dorsal, covered by a broad flat papilla, and with posteriorly a pair of small slender cirri. Colour translucent white, intestine buff or greenish brown, pharynx salmon-pink. In sand at and below water. Nearly ripe in August.

The larvæ have been described by Fewkes as *Prionospio tenuis*, from Newport, and by Andrews from Beaufort, N.C., and Wood's Hole.

Under the family of the Cirratulidæ, *Cirratulus chiajii*, M'Intosh, has been subsequently described as *Cirratulus norvegicus*, De Quatrefages, but Della Chiaje had long before termed it *Lumbricus filigerus* and *Cirratulus filigerus*, so that if priority held such would be its title. It is perhaps doing no injustice to De Quatrefages or other author by giving it the title *C. chiajii* after its early investigator.

A form termed *Cirratulus norvegicus* in the 'Annals' for February 1911 †, has since that date been named *Cirratulus mcintoshii* by Southern ‡, who found it in Inishlyre, Killary, and Bofin harbours. It is interesting to find this Norwegian species in British waters.

\* Unfortunately, the specimen sent by Mr. Southern had no ninth segment.

† Ann. & Mag. Nat. Hist. ser. 8, vol. vii. p. 171.

‡ Proc. R. I. Acad. vol. xxxi. No. 47, p. 110.

*Macrochaeta clavicornis*, Sars, was procured between tide-marks in Blacksod Bay, and dredged elsewhere on the West Coast of Ireland (*Southern*). The head is distinctly defined, with a median process to the blunt snout, and four large eyes arranged nearly transversely, the larger being external. Two clavate palpi arise from the peristomial segment; four pairs of somewhat clavate cirri from the next four segments. The body is from 0.75 to 1 cm., somewhat spindle-shaped in spirit, and densely covered with papillæ. Tufts of long translucent bristles with minute spines occur dorsally, whilst ventrally are peculiar, flattened, large, transparent, and articulated hooks and bifid tips. Its wide distribution is shown by its occurrence in Norway and Madeira. In general aspect, at first sight, this form resembles a Chloræmid, and it has a densely papillose skin and long, slightly spinose bristles. The papillæ agree in minute structure with those of the Chloræmids, and mud and sand occur in the interstices. The pigmented anterior region ends bluntly, with a median process, somewhat like the central apparatus of *Stylarioides arenosa*. The four eyes, arranged nearly transversely, are very distinct. The example, kindly sent by Mr. Southern, is mature, since the posterior region had many large ova. The alimentary canal harboured *Opalinæ* with two vacuoles.

Marion and Bobretzky\* (1875) describe *Heterocirrus frontifilis*, Grube, from Marseilles, which, in many respects, agrees with *Macrochaeta*.

In the family of the Halclminthidæ is *Notomastus rubicundus*, Keferstein, from fine clean sand, Plymouth (*Allen*). The cephalic region is conical, with four larger eye-specks and two groups of smaller eyes in front, a lobulated nuchal organ on each side. Body 10 cm. long and 2 cm. broad, vermiform, slightly enlarged anteriorly about the sixth segment, tapered posteriorly, and ending in a button-shaped tail, all with neural parapodia and dorsal parapodial gills (*Eisig*). Genital opening at the fifth pair, and two in the sixth. Thorax reddish, abdomen brownish or yellowish green, or bluish green anteriorly. Bristles simple, winged, tapering; eleven pairs. Abdominal hooks with four teeth in lateral view, from the thirteenth segment backward. Mature from December till May.

Keferstein, who discovered this species at St. Vaast-la

\* Ann. Sc. Nat. 6<sup>e</sup> sér. t. ii. p. 64, pl. viii. fig. 18, and pl. ix. fig. 18.

Hougue, gives a detailed description of its structure. The body measures 250 mm., and is divided into an anterior and a posterior region, the latter commencing at the twelfth bristled segment. The hook-rows are short dorsally, long ventrally in the posterior region. There are two pairs of cephalic ganglia, and the great nerve-cords have neural canals. The alimentary canal has a papillose proboscis, œsophagus, oval stomach, and a gut which terminates on the last segment, the anus having a short ventral lobe. The segmental organs occur in every segment, and probably open between the dorsal and ventral feet, though he found another pore on each side behind it. He did not notice the sexual apertures with the hooks, his example being a female. Externally was a parasitic *Loxosoma*.

*Heteromastus filiformis*, Claparède, again occurred in sand west of Salthouse Lake, Plymouth (*Allen*). The cephalic region agrees with that of the type (*Claparède*), and so with the proboscis, which has clavate papillæ. The body reaches the length of 6 cm., and there are over one hundred segments. The digestive and the perivisceral systems agree with *Capitella*. The anterior segments are short and broad, the posterior long and narrow. The anterior bristles are winged, the posterior with the characteristic hooks dorsally and ventrally.

All that is known of the coloration of *Cæsicirrus neglectus*, Arwidsson (of the family Maldanidæ), a species by no means uncommon, is the remark by Cunningham and Ramage\* in their "Polychæt Fauna of the Firth of Forth," that in their "*Axiotea catenata* the colour is pinkish, pale towards the anterior end, with broad bands surrounding the body at intervals." The region whence these authors drew their supply has since altered its character, probably from pollution, so that a careful search was unsuccessful. It lives gregariously in tubes of sand-particles sunk in the sand. In examples from Wales† the anterior end of the Annelid is somewhat pale, though the median vessel causes a streak along the dorsum, the blood at the same time tinting the cephalic plate. In front of the third bristle-tuft the region has a smooth and glistening cuticular coat, which is iridescent, and at the segment-junction in front of the

\* Trans. Roy. Soc. Edin. vol. xxxiii. p. 679 etc. (1888).

† I am indebted to Mr. Arnold Watson for living examples.

tuft (third) a faint reddish belt, apparently from a blood-vessel, occurs. The next segment-junction has a belt of red on each side of it, apparently of reddish pigment, the specks of which pass a short way on the following segment (fifth bristled), which has its bristle-tuft about the middle. Then there is a slight constriction of the body-wall, at which a broad red belt occurs, a bristle-tuft (sixth) being placed just in front of another red belt which passes all round the body. The next bristle-tuft (seventh) is in front of a furrow marking another segment, the anterior third of which has the broadest band of red yet met with in front. This is followed by a pale region ending at the next bristle-tuft (eighth), and concluding the specially differentiated region anteriorly, the seventh and eighth tufts being separated by a long interval.

The next segment and half of the following are coloured except at the margins by a longitudinal belt of red, apparently along the intestine, probably from an intestinal sinus, and thereafter the reddish hue is due to the longitudinal and circular vessels, especially those of the gut, the tip of the tail and its cirri being pale. In these examples the majority of the short anal cirri had processes at the tip, as Arwidsson shows in his figure\*, and describes as "short, finger-like lobes," some being only bifid, others trifid or quadrifid, whilst each of the processes in a bifid form may have two or more minor papillæ at the tip. Occasionally the cirrus ends in a bluntly conical apex with a minute papilla at each side near the apex. The gut itself is yellowish or pale orange. The proboscis, which is constantly protruded by the animal, when removed from its tube shows a tinge of red from a blood-vessel along the middle, and its distal region appears to be smooth.

In *Petaloproctus terricola*, De Quatrefages, another addition, the head is fused with the buccal segment and without a marginal ridge. Body about 18 cm. long, 2-3 mm. broad, and of twenty-four segments, twenty-two of which are setigerous. First segment distinctly separated from the buccal. First three segments have no ventral division. In the others there are two ventral tori, each with about forty crotchets. Dorsal bristles strong, yellow, and winged, and others colourless, not winged, spinous. Behind the sixth or seventh segment are capillary bristles, sinuous and long (overlooked by Claparède and Grube) with minute spines. In seven or eight posterior segments in front of the anal,

\* Proceed. Roy. Irish Acad. vol. xxix. no. 6, p. 219.

between the dorsal and ventral divisions, is a fleshy process, adherent dorsally and pointing ventrally, separated by the two setigerous processes at the tori, and resembling those of *Maldane cristagalli*, Claparède. Anal segment achætous; anus near the ventral edge, whereas in *Maldane* it opens towards the dorsum. Two or three furrows are prolonged from the ventral to the dorsal surface—which De St. Joseph regarded as rudiments of segments.

The *cephalic region* of a specimen sent by Mr. Southern from Blacksod Bay resembles that in *Nicomache*, though somewhat longer and more projecting ventrally. A keel arises a little above the mouth and runs vertically to the dorsal edge. The surface is speckled with pigment as in *Nicomache maculata*. Each of the three following segments bears a spine below the dorsal tuft of bristles, four of these tufts characterising the anterior region. Three long segments follow those with the spines, the third the longest, with two hook-rows, viz., an anterior and a posterior. This segment is of softer consistence than those in front. The anal plate has an expanded smooth margin, which projects freely all round, except dorsally, and has the anus on its posterior surface a little within the ventral broad rim, and it shows a radiate arrangement of its margin. Apparently two narrow rings next it are achætous, that in front of these has a row of hooks and a tuft of bristles of considerable length. The dorsal surface of the third, fourth, fifth, and sixth segments in front of the anal plate present a median conical free flap pointing backward, the third having a pedicled process like a *Loxosoma* attached to it. These eminences increase in prominence from the sixth backward.

The bristles of the first region (four segments) are pale golden and brittle, having a straight shaft and a curved, finely-tapered tip with narrow wings. The spine in these segments is stout, golden, and pointed, the tip being slightly hooked.

The bristles of the middle region are pale golden and of two kinds, a stronger series of about five with stout shafts and tapering winged tips, and a more numerous group of slender capillary bristles which extend considerably beyond the former. The tips of the stout series in front of the tail are somewhat longer, but the capillary bristles are shorter, for they do not reach the extremities of the stout forms.

The hooks in the smaller example are stout and rather short, with a base dilating up to the shoulder, which has a hump posteriorly; then the neck is narrowed where it is

grasped by the cuticle, again dilates toward the main fang, a distinct bulge occurring below the origin of the gular bristles, where it is again narrowed below the main fang—which is curved at less than a right angle to the neck, and has four teeth above it. The neck and shaft are boldly striated. In the larger specimen the main fang leaves the neck nearly at a right angle, and above it are four prominent teeth. The gular bristle appears to be single, and sometimes curves beyond the main fang and over it.

This species was first obtained by De Quatrefages, whose description is fairly complete.

Two examples of *Heteroclymene robusta*, Arwidsson, come from Plymouth, and I have to thank Dr. Allen for the opportunity of examining them. Besides the lateral notches in the cephalic border, the rim behind has crenations, the median deepest posteriorly. The segments in the middle of the body can be much elongated, one being about an inch and three-quarters; the bristles and rows of hooks project outward on enlargements at the segment-junctions. The anal disc is an exquisite structure, as finely radiate as the operculum of *Serpula vermicularis*, only the anus is in the centre of a cone, over which the radii pass downward and then upward to the minutely crenate edge. The mid-ventral cirrus is somewhat flattened, as well as longest, and there are three or four shorter cirri on each side, somewhat irregularly arranged, a portion of the dorsal edge being bare.

The tube is as thick as that of *Lanice conchilega*, but firmer, retaining its cylindrical form until somewhat severe pressure is applied. It is composed of shell-fragments, minute shells, spines of Echinoderms, smoothly filled in with fine grains of sand and secretion.

In *Micromaldane ornithochæta*, Mesnil, from Clew Bay (Southern), a minute form, measuring 4 mm. long, the cephalic region, when viewed from above, is somewhat clavate and symmetrically rounded (elliptical). In lateral view it is irregularly clavate, the dorsal outline being smoothly curved and ending ventrally in the projecting snout, which slopes backward and slightly upward to the mouth.

The body is comparatively short, consisting of nineteen segments, seventeen of which are bristled. It is enlarged anteriorly, is cylindrical in the middle, and tapers posteriorly

to the truncated posterior end. The middle region consists of two long segments. The caudal part is crenated from the various rings, and the achæitous last segment is truncated distally with a small papilla—probably representing the anus. Glands are distributed extensively in the body-wall.

The bristles have the shape of a pointed assegai or sharp spear, the cylindrical shaft being stout, and the tip a flattened translucent spear-point.

The hooks are minute, apparently few in number, and have a rudimentary shaft, which enlarges into a bulbous shoulder, above which the neck is rather thick. The main fang is curved downward at considerably less than a right angle to the neck, and the crown of the hook is high, with five or six teeth. In general shape these hooks somewhat resemble those of *Lumbriclymene minor*, Arwidsson. No gular bristles are present. Mesnil thought the hook resembled an avicular Sabellarian bristle, and that it showed the evolution of a Maldanid toward that group. Such views, however, are conjectural. He found one example containing greyish ova.

## EXPLANATION OF THE PLATES.

### PLATE I.

- Fig.* 1. Serrated or spiked bristle of *Eumenia caulleryi*, sp. n.  $\times 350$ .  
*Fig.* 2. Smooth dorsal bristle.  $\times 350$ .  
*Fig.* 3. Branchiæ of one side.  $\times 350$ .  
*Fig.* 4. *Brada gravieri*, sp. n. Enlarged under a lens.  
*Fig.* 5. Dorsal tuft of bristles.  $\times 350$ .  
*Fig.* 6. Great ventral bristles, the base being at the top of the Plate.  $\times 350$ .  
*Fig.* 7. Anterior bristle of *Fauveliopsis challengeræ*, sp. n.  $\times 350$ .  
*Fig.* 8. Pear-shaped papilla of the foot.  $\times 350$ .  
*Fig.* 9. Anterior bristles of greenish papillose Oligochaet, *Hemitubifex benedeni*, Beddard, from St. Andrews.  $\times 350$ .  
*Fig.* 10. Posterior hook.  $\times 350$ .

### PLATE II.

- Fig.* 1. *Fauveliopsis challengeræ*, sp. n., from the dorsum. Enlarged.  
*Fig.* 2. Ventral aspect of the same. Enlarged.  
*Fig.* 3. Lateral view, showing the lozenge-shaped areas between the bristle-tufts. Enlarged.  
*Fig.* 4. The anterior region more highly magnified.  
*Fig.* 5. Anterior bristles projecting from the foot.  $\times 350$ .  
*Fig.* 6. Posterior tuft of bristles.  $\times 350$ .  
*Fig.* 7. Tube of the foregoing. Twice natural size.  
*Fig.* 8. End of tube, more highly magnified.  
*Fig.* 9. Lateral view of the anterior segments of *Eumenia hystericis*, sp. n. Enlarged under a lens.  
*Fig.* 10. Hook of *Melinnia buskii*, sp. n.  $\times 700$  diam.  
*Fig.* 11. Outline of *Phascolosoma lankesteri*. Magnified under a lens.  
*Fig.* 12. Posterior end of the latter with papillæ.  $\times 90$ .

## PLATE III.

- Fig. 1. Tip of large bristle of *Brada gravieri*, sp. n.  $\times 350$ .  
 Fig. 2. Hooked bristle of *Fauveliopsis challengeræ*, sp. n.  $\times 350$ .  
 Fig. 3. Dorsal bristle of *Trophoma sarsi*, sp. n.  $\times 90$ .  
 Fig. 4. Simple long ventral bristles (*a* and *b*).  $\times 90$ .  
 Fig. 5. Long spinous ventral bristle.  $\times 90$ .  
 Fig. 6. Tip of the foregoing.  $\times 350$ .  
 Fig. 7. Large and long serrated ventral bristle of the third kind with bifid tip.  $\times 90$ .  
 Fig. 8. Serrated tip of the same.  $\times 350$ .  
 Fig. 9. Curved bristle, with broad base, of *Gephyrean A.*  $\times 350$ .  
 Fig. 10. Tip of hooked form.  $\times 350$ .  
 Fig. 11. Outline of the base of the anterior process of *Phuscolosoma lankesteri*, showing obliquity.  $\times 90$ .
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II.—*New Species of Carabidæ from South Africa.*

By C. N. BARKER, F.E.S.

THE types of all the species described below are contained in the collection of the Durban Museum, and paratypes have been forwarded for acceptance to the British Museum (Natural History) of all except the following, which are uniques, viz.:—*Chlenius incandescens*, *Chlenius murleyi*, *Callistominus obscurus*, *Platynus suturalis*, and *Callistominus pulchellus*. The last-named species is already represented in the National Collection by one or more examples, *teste* Mr. H. E. Andrewes, to whom I am much indebted for kind assistance in comparing my types with those of allied species.

## Tribe LEBIINI.

*Lebia durbanensis*, sp. n.

Length 7–8 mm.; width 3–4 mm.

Head dark to piceous red, mouth-parts and antennæ rufescent. Prothorax centrally deep to piceous brown, shading off marginally to testaceous. Legs and beneath testaceous yellow, the latter a shade darker than the former, with the sides and apical segments of abdomen and the pygidium piceous. Elytra pale testaceous yellow, patterned with black as follows: a sutural basal subquadrate patch covering intervals 1–4, below obliquely contracting inwards to the first, thence in three successive steps of one interval each widening to a little below middle, where it emits a narrow spur connecting usually, but not always, with the inward widening of a submarginal band extending from



the shoulder to a very short distance below it; the posterior end of submedian patch squarely truncate.

*Head* deeply, sub-confluently punctate; epistome and labrum smooth, shiny. *Antennæ* slender, elongate, filiform.

*Prothorax* transverse, apical angles broadly rounded, lateral margins widely grooved and reflexed, straight but a little inclining inwards to posterior angles which are right and moderately sharp, apex emarginate, base produced, disc rugosely punctate, convex, median line broadly and deeply grooved, reaching from near apex to the transverse basal depression.

*Elytra* elongate-ovate, shoulders rounded, gently ampliate to below middle, slightly contracted to outer angle, and then sinuately truncate to apex, narrowly and shallowly striate, hardly perceptibly or not punctate, intervals plane, smooth, and shiny.

*Beneath* shiny and aciculate.

*Hab.* Coast bush about Durban. Common.

*Lebia durbanensis*, race *malvernensis*, mihi.

A local variety of above which shows some consistently divergent characteristics, which, I think, justify its bearing a distinctive name.

Shape and size as in *durbanensis*, but differentiated from it as follows:—Puncturation of head and transverse plication of prothorax coarser and deeper, the coloration of the latter rufescent, more or less darkened centrally; striæ of the elytra deeper and distinctly transversely punctate, intervals a little raised (in typical *durbanensis* they are quite plane). The pattern is the same, but less developed, the submedian patch being usually separated from the submarginal band by a considerable interval of the ground-colour. The pygidium is pale reddish instead of piceous, and all my examples have conspicuously developed tubercles at their outer angles, which are wanting in both sexes of the numerous examples of *durbanensis* that I have examined. The colour beneath and of legs is paler and the integument smoother, aciculation only being visible in the strongest lights.

*Hab.* Malvern, Natal. Common under bark.

Specimens of these two races of *durbanensis* have been compared for me with the type of *L. insidiosa*, Pér., which is in the British Museum (Nat. Hist.) by my friend Dr. G. A. K. Marshall, who pronounces them as quite distinct from that species. *L. insidiosa* was originally described by

Dr. Péringuey from this unique example, and, no longer having the type in his possession, he evidently subsequently confounded my *durbanensis* with his species, and thus wrongly determined those examples which I submitted to him many years ago, and which have until now been labelled in my collection as "*L. insidiosa*, Pér."

I quote from Dr. Marshall's letter the points upon which *durbanensis* differs:—"Apart from its larger size and different elytral pattern your insect differs from the type of *insidiosa* in the coarser and more wrinkled puncturing of both head and thorax. Moreover, in *insidiosa* the head is of a uniform testaceous-red colour."

*Lebia apice-fusca*, sp. n.

Length 5 mm.; width  $2\frac{1}{4}$  mm.

Head and prothorax light reddish testaceous, the former darkening gradually from neck to and including mandibles; palpi, three basal joints of antennæ and legs testaceous yellow; terminal joints of antennæ black; upper sides of palpi often infuscated. Elytra, except a narrow ill-defined apical and lateral infuscated area, and the whole of the pectus deep testaceous yellow. Pygidium and abdomen piceous.

*Head* finely, neck hardly punctate, shiny.

*Prothorax* transverse, nearly twice as broad as long, anterior angles broadly rounded; sides from about middle to hind angle, which is widely reflexed and acutely right, nearly straight; disc convex, very finely plicate-punctate, with a well-defined median line bifurcate subapically; base truncate, lightly impressed between median line and posterior angles.

Judging from description alone—for the species is unknown to me—*apice-fusca* must be nearly allied to Chaudoir's *L. fuscula*, which is also recorded from Durban. The antennæ and underside of *fuscula* are described as light yellow, and there is no mention made of any infuscation about the apical area, which is always present, more or less, in all the numerous examples which I have examined of *apice-fusca*.

These discrepancies in coloration of antennæ, abdomen, and elytra are, I think, sufficient to justify its acceptance as a species distinct from Chaudoir's insect.

*Hab.* Durban, Natal. Common under bark of trees growing on the coast sand-dunes, but not met with further inland.

## Tribe MORIONINI.

*Morio attenuatus*, sp. n.

Length  $13\frac{3}{4}$  mm.; width  $4\frac{1}{4}$  mm.; width of prothorax  $3\frac{1}{4}$  mm.

Jet-black, very shiny; palpi, mouth-parts, pectus, abdomen, coxæ, and femora dark to piceous red.

*Head* smooth, shiny; clypeus broadly incised; epistome emarginate, impressed centrally; on either side, from between eyes and reaching to epistome, a long narrow sinuate groove; supra-ocular carinæ moderately developed; *antennæ* black, first three joints smooth, shiny, fourth a little pubescent apically, remainder densely clothed with dirty yellowish pubescence.

*Prothorax* transverse, shiny, faintly plicate, declivous laterally and at front angles, anterior margin squarely truncate, its angles briefly rounded, sides gently amplified to beyond middle, gently contracted and hardly sinuate, thence to the acute posterior angles; margins moderately reflexed, median line narrow and faintly punctate, lateral basal grooves and depressions moderately deep, base emarginate.

*Elytra* elongate, narrow, a very little wider than prothorax, shoulders briefly rounded, dentate, sides straight, gently rounded towards apex, and a little sinuate at outer angles, narrowly striate, intervals smooth, a little raised laterally, margins with spaced punctures inside the epipleuræ, more closely set in the posterior parts, a puncture on the third interval, above the posterior declivity.

Smaller and narrower than *M. guineensis*, Imhoff, and differentiated from it on the following points:—Apex of the prothorax straight, angles not projecting upwards, sides evenly rounded and more declivous, giving it a convex appearance. Supraocular carinæ more rounded, less prominent; antennæ relatively longer and more slender, joints less moniliform. The coloration of the legs and underside are quite different.

*M. senegalensis*, Lafert.; *M. feronioides*, Thoms.; *M. acuticollis*, Putz.; and *M. anthracinus*, Boh., are all placed as synonyms of *M. guineensis* by Péringuey, so if he be correct they cannot refer to this species. Boheman gives the dimensions of his *M. anthracinus* as 13 mm. long by 5 mm. wide, which differentiates it as a much broader insect than *attenuatus*, mihi.

The two examples in my possession (♂ and ♀) have been

compared with species contained in the British Museum by Mr. H. E. Andrewes, with none of which, he says, does it agree.

*Hab.* Natal: Upper Tongaat. Found in a decayed tree-stump by the author.

### Tribe SCARITINI.

#### *Scarites giganteus*, sp. n.

Length 40–45 mm.; width  $13\frac{1}{4}$ – $14\frac{1}{2}$  mm.; width of prothorax identical with that of elytra.

Black, hardly shiny; head quadrate, nearly twice as wide as long, frontal part triangularly grooved or depressed on either side between and below eyes, the impressions, epistome and mandibles longitudinally plicate, the plications on the mandibles forming deep folds; posterior part of head almost smooth, faintly transversely wrinkled.

*Prothorax* nearly twice as broad as long, transversely wrinkled like head, apex straight, sides below apical angles rounded and amplified for a short distance, then gradually and nearly straightly contracted to the break in the margin immediately above the posterior setæ, whence they are obliquely and a little sinuously drawn in to base; base one-third less wide than apex, broadly excavate, and both it and the lateral margin narrowly reflex-bordered; below front, from angle to angle, a submarginal inwardly sinuate line, the space between it and margin, except for a brief median interval, longitudinally plicate.

*Elytra*: base squarely truncate, narrower by one-third than the prothorax, humeral angles dentated, sides gradually amplified from shoulders to below middle, where the elytra are as wide as the prothorax at its widest, thence gently rounded to apex, striate, the first five striæ very shallow and intervals quite plane, the sixth and all intervals towards apex a little raised, the seventh and eighth subcarinate; the eighth interval narrows towards and does not quite reach the base and apically bends inwards, coalescing with the intervals 6 and 7; the strial interstices at base, shoulder, and the whole length and width of the broad intermarginal groove densely granulate; on either side a setigerous supra-apical puncture on the third interval.

*Beneath* smooth and shining, except for some sparse plications about the sterna and striæ covering the anterior coxæ.

The nearest ally to *giganteus* appears to be *S. doguerai*,

Gory, which is, however, considerably smaller, 35–38 mm. long and 12–12½ mm. wide, and is described—for I have not seen it—as having the elytral striae deep from base to apex, with the intervals raised and the three outer ones subcarinate, which is certainly not the case with the four examples of *g. ganteus* that I have before me. The humeral angles in my species are sharply dentate and relative to other species of the genus; these dentitions cannot be described as small (*vide* vol. vii. p. 393, Trans. S.A. Phil. Soc. 1896). Further, the head and prothorax of *dogueraii* are stated to be proportionately the same as those of *rugosus*. Compared with *rugosus* the head and prothorax of *giganteus* are relatively appreciably more transverse, especially the former.

*Hab.* Namaqualand: Port Nolloth. Plentiful in sand-burrows, *teste* H. D. Stanton, who collected them.

### Tribe PANAGÆINI.

#### *Microcosmus elegans*, sp. n.

Length 8 mm.; width 3¼ mm.

Black, shining, sparsely pubescent, lateral margins of prothorax and four patches or spots (two on either side) on the elytra orange-yellow; labrum and first two joints of antennæ glabrous, testaceous red, the remaining joints of the latter pubescent, piceous, more or less reddish at bases of articulations; palpi pale reddish testaceous, the terminal joints more or less darkened basally.

Legs orange-yellow.

*Head and prothorax* shining, densely scribiculate-punctate, with a long sparse pubescence; antennæ and palpi elongate, the former slender, filiform, reaching to below middle of elytra, third joint longer than the fourth, the latter with all the terminal joints securiform.

*Prothorax* transverse, at apex confluent with neck, broadly amplified to a little beyond middle, and thence somewhat abruptly and sinuately contracted and reflexed to the posterior angles, which are sharply right, narrowly margined from a little below apex and gradually widening into a broad orange-yellow border to base; base truncate, twice as wide as apex, the median groove and lateral foveæ vaguely defined.

*Elytra* truncated and declivous at base, shoulders squarely rounded, twice as wide as prothorax at base, moderately convex, sides subparallel for about two-thirds the length,

thence broadly rounded to apex, deeply striate-punctate, intervals convex, densely, confusedly punctulate, sparsely clothed with long yellowish pubescence and, on either side, a broad transverse orange-yellow subhumeral patch more or less indented beneath, reaching a little obliquely downwards from the lateral margin to the second interval; a second much smaller, but variable in size, subapical, oval patch between the third and seventh striae.

In its more elongate shape, long slender antennæ, palpi, legs, and tarsi this insect agrees well with Bate's definition of *Dischissus*, but this genus is described as having the anterior and intermediate tarsi bilobate, which is certainly not the case with *elegans*, in which they are the same as in *Microcosmus*, a little emarginate or incised. In the shape of the prothorax *elegans* approximates to *M. aurantiacus*, Chd., but the constriction to base is much more pronounced, and the elytra are also comparatively shorter.

Described from three examples, all taken at light.

*Hab.* Natal: Durban and Isispingo.

### Tribe CHLÆNIINI.

#### *Chlænius incandescens*, sp. n.

Length 14 mm. ; width 5 mm.

Head and prothorax glowing metallic red with some green reflections in certain lights; labrum, palpi, antennæ, and legs reddish brown; elytra opaque black; underside black and shiny; pubescent above and beneath.

*Head and neck* elongate, very shallowly plicate-punctate laterally and basally, vertex almost smooth, a few coarse punctures on either side of the two frontal foveæ, which are shallowly connected with a third subvertical fovea and together form an ill-defined V; *palpi* long, slender, and cylindrical; *antennæ* filiform.

*Prothorax* cordiform, a little convex, declivous on either side to apical angles, which hardly project, posterior angles acutely rectangular, base and apex straight, lateral foveæ deep and curving outwards, a well-defined transverse impression a little above base and extending on either side to the lateral margins, the median groove deep, commencing in a short transverse sulcus a little below apex and terminating at its juncture with the transverse basal impression, rugosely plicate-punctate, sparsely pubescent, the punctures below the subbasal impression denser and deeper, and the pubescence longer.

*Elytra* elongate, about one-third wider than the prothorax (length  $8\frac{1}{2}$  mm.), shoulders broadly rounded, sides hardly perceptibly amplified to above apical declivity, a little sinuate between the outer and apical angles, finely striate, intervals plane, densely shagreened, pubescent, the pubescence longer laterally and posteriorly.

*Underside*: prosternum and sides plicate-punctate, pectus rugosely cicatricose punctate, venter aciculate-punctate, margins a little rougher, pectus and abdomen sparsely clothed with long pubescence or hairs.

A single female example taken at the electric lights, Durban, 1907, by H. W. Bell Marley. Has no near ally among the South-African specimens known to me.

*Hub.* Natal: Durban.

*Chlenius (Ocybatus) durbanensis*, sp. n.

Length 11–11½ mm.; width  $3\frac{1}{2}$ –4½ mm. (♀ ♀.)

Head and prothorax above metallic blue-green, the latter pubescent beneath, darker and of a more purplish shade; labrum, mandibles, maxillæ, and palpi red, the latter more or less infuscated except at tips; antennæ—first joint and part of second red, the rest infuscated. *Elytra* dark greenish blue and bearing, on either side, above the apical declivity an ovate flavescent spot covering the intervals 5–7 inclusive and occasionally just invading the fourth. Legs reddish testaceous; pectus and abdomen dark purplish blue with some metallic-green reflections about the prosternum.

*Head* faintly punctulated, its vertex smooth; antennæ filiform, very long, and slender; palpi—both maxillary and labial much dilated and triangularly truncated in the ♂ ♂; maxillaries of ♀ ♀ simply swollen and squarely truncated.

*Prothorax* narrow, elongate, of about equal width at apex and base, a little convex and declivous towards front angles, sides gently amplified and rounded, margins briefly recurved and a very little sinuate above the posterior angles, densely sub-confluently punctured, median line fine but distinct, lateral basal fovea not deep.

*Elytra* elongate, much broader than prothorax, shoulders sloping, sides in the males very little (in the females more) amplified to beyond middle, briefly yellow, pubescent, narrowly punctate-striate with the intervals shagreen-punctate.

*Underside*: glabrous; thorax and pectus coarsely but irregularly punctate, sides of abdomen sparsely plicate-punctate, a wide space between smooth and shiny.

The outlines of the prothorax and elytra are almost

identical with those of *Chlænius reichei*, Chd., with which it also assimilates in the characteristics of the palpi in both sexes.

It has little in common with *Chlænius bohemani*, Chd., with which species Dr. Péringuey inexplicably confused it, when I submitted it to him for determination.

*Hab.* Natal—Malvern, Durban; Rhodesia—Salisbury, *teste* H. E. Audlews, British Museum Collection.

*Chlænius (Vertagus) marleyi*, sp. n.

Length 11 mm. (♂)—12½ mm. (♀); width 4–5 mm.

Head and prothorax metallic blue, pubescent, the latter in one example with some lighter green reflections within the grooves of the lateral margins: palpi and mouth-parts piceous, a little reddish at apices; first joint of antennæ reddish flavescens, the rest black. Elytra subopaque, deep purplish blue with on either side a supra-apical orange spot, occupying the intervals between striæ 3 to 8. Underside shiny jet-black: legs reddish flavescens with knees, tibia, and tarsi black.

*Head* elongate, plane, finely and closely punctured except on vertex, where the puncturation becomes faint and irregularly spaced. Eyes very prominent; labial palpi securiform in both sexes, maxillaries securiform in males and truncately clavate in females; antennæ elongate, the middle joints a little widened and compressed.

*Prothorax* explanate from the anterior angle to about middle, where it is slightly angled, thence roundly contracted to posterior angle, lateral margins sharply reflexed, forming a deep fold which widens posteriorly, apex straight, a little narrower than the base, which is slightly emarginate, disc very little convex, coarsely sub-confluently punctate, median line distinct, not quite reaching base and with deep basal foveæ on either side.

*Elytra* about one-third wider than prothorax, shoulders broadly rounded, sides in the male nearly straight, in the female a little amplified to beyond middle, striæ deep, not perceptibly punctate, intervals a little raised, densely shagreen-punctate, and briefly pubescent.

Nearly allied to *C. fenestratus*, Chd., in which the palpi and antennæ are similarly constructed. Judging by the description—for I have not seen the insect,—*C. effugiens*, Pér., must be very nearly related to *C. marleyi*, but differs from it in having unicolorous flavescens legs. It is also doubtful whether the very slight angulation of the sides of



the prothorax in this species is as marked as that referred to in *C. effugiens*, and the shape of the palpi is not even mentioned.

*Hab.* Krantzklouf (male) ; Durban (female)—taken by H. W. Bell-Marley.

*Chlænium (Vertagus) fenestratus*, Chd.

This species has been placed by Dr. Péringuey in synonymy (as a variety) with *Chlænium bohemani*, with which, if my examples of *C. fenestratus* have been rightly determined \*, it has no close affinity.

Many of the differences which I have pointed out between *C. bohemani* and *C. durbanensis*, m., recur as between *C. bohemani* and *C. fenestratus*, chief of which is the dissimilarity in their respective palpi.

Comparing females (*fenestratus*, 3) with females (*bohemani*, 2)—for unfortunately I have no male examples of *fenestratus* before me—the following discrepancies occur :—

<i>C. bohemani</i> .	<i>C. (Vertagus) fenestratus</i> .
<i>Palpi</i> .—Labials moderately dilate, squarely truncated.	Broadly securiform, diagonally truncated.
Maxillaries very slightly dilate, squarely truncated.	Dilated, diagonally truncated.
<i>Head</i> .—Robust, nearly as broad as long, densely punctate over whole surface.	Slender, decidedly longer than wide, very finely plicate-punctate, vertex nearly smooth.
<i>Prothorax</i> .—As wide at apex as at base, coarsely subconfluently punctate.	Narrower at apex than at base, closely, simply punctate.
<i>Elytra</i> .—Subparallel in both sexes, supra-apical spot sinuate, diagonal.	Females a little amplified to beyond middle, spot ovate covering intervals 4-7.
<i>Underside</i> .—Sternal parts rugosely coarsely punctate, abdomen shiny black.	Irregularly shallowly punctate, very shiny and iridescent.

When, added to the above, the differences in the coloration of the legs and antennæ are taken into account, it is difficult to conceive on what grounds Dr. Péringuey should have lumped them together—the more so, as both being the creations of one author (Chaudoir), he must have had the types of the one to compare with the other, and doubtless

An example has been, since writing the above, compared with examples so labelled in the British Museum Collection, and *teste* H. E. Andrewes they are identical.

had ample grounds for describing them as distinct species. Its nearest allies amongst the South-African fauna known to me are *C. durbanensis*, m., and *C. reichei*, Chd.

*Chlœnius clarksoni*, sp. n.

Length 19 mm. (♂)—21 $\frac{3}{4}$  (♀) mm.; width 8 $\frac{1}{2}$ –9 mm.

Thorax length 5–5 $\frac{7}{8}$  mm.; width 6 $\frac{3}{4}$ –7 $\frac{1}{8}$  mm.

Apterous; head, prothorax, and elytra reddish to glowing coppery bronze with vivid green reflections in strong lights; epistome, labrum, mandibles, palpi, and first three joints of antennæ piceous; apices of palpi, labrum, and remaining joints of antennæ reddish.

Legs and beneath black, very shiny. Head densely coriaceously wrinkled and irregularly longitudinally plicate on either side; epistome and labrum smooth, shiny.

*Prothorax* subtrapezoid but with a little sinuation above the posterior angles, apex bisinuate, frontal angles projecting but not sharp; sides margined, gently rounded to about middle, thence, except for a slight sinuation above the posterior angles, straight to base; base shallowly emarginate, disc convex, very declivous frontally, coriaceously wrinkled, median groove and subbasal foveæ moderately deep and very shallowly connected by a subbasal depression.

*Elytra* hardly wider than prothorax at base, humeral angle slightly projecting beneath it, sides nearly straight in male and a little more ampliate in female, broadly rounded to and very slightly sinuate above apex, convex, striæ moderately deep and wide, not or barely perceptibly punctate (puncturation is faintly indicated in some examples by faint spaced pin-pricks), intervals raised and very finely shagreened, nearly smooth.

*Underside*: pro-, meso-, and metasterna smooth save for a few shallow transverse plications, the episterna densely, rugosely aciculate-punctate; abdomen very finely wrinkled with rough plications laterally, the metepisterna, segments of venter laterally, and intermediate femora with some scattered pores bearing long red setæ (in unrubbed specimens).

Very nearly allied to *Chlœnius cham*, Chd., to which it is similar in size and shape, and which also appears to be wingless. Apart from its bright metallic coloration, not a trace of which is observable in *cham*, it differs from it in the following points. Antennæ shorter (especially noticeable in the respective males), a little more compressed and more slender at bases of articles. The sculpture

of head and prothorax is finely coriaceously plicate. In *cham* the plications are very faint, sub-obsolete, and, *per contra*, the subbasal depressions and foveae are deeper. The intervals of the elytra are in *cham* more carinate, the striae narrower, deeper, and distinctly punctate. There is a complete absence of metallism in all specimens of *C. cham* that have come under my observation. I have examples of this species from districts as wide apart as the neighbourhood of Durban and Frere, *i. e.*, 161 miles, and with a difference in altitude of 3500 feet, yet they show no variation from type. The altitude of Harding is approximately the same as that of Frere, but considerably more than  $1\frac{1}{2}$  degrees to the southward. It must be confessed, however, that the modifications of structure and sculpture are only slight, and further knowledge may prove later *clarksoni* to be only a local race or subspecies of Chaudoir's insect.

Specimens of *C. clarksoni* show considerable variation in the extent of metallic green underlying the bronze. Some appear to be nearly wholly green in strong lights and others under similar conditions show only faint traces of it. It is always more or less noticeable about the margins and in the interstices of the elytra. I submitted one or more examples to Dr. Péringuey, in the year 1899, who then pronounced it a new species and gave it the MSS. name *barkeri*, but no published description nor further mention of it has since reached me.

All the examples so far known to me were collected by Mr. Clarkson on his farm near Harding, Alfred County, Natal, who informed me that he found them harbouring under dry cow-dung.

#### SOUTH-AFRICAN *CHLÆNI* WITH A *CALATHUS*-LIKE FACIES.

Of this very distinctive section of a huge genus Dr. Péringuey, in his 'Descriptive Catalogue,' 1896, pp. 517-519, has described or referred to six species, five of which are represented in the Durban Museum Collection, namely, *Chlænium dichrous*, Wied.; *C. piceus*, Chd.; *C. trapezicollis*, Chd.; *C. natalensis*, Chd.; *C. erythrocnemis*, Chd.—leaving only *C. oodioides*, Chd., unaccounted for.

*C. cham*, Chd., and *C. clarksoni*, mihi, described above, I have purposely omitted, as I consider they belong to a class apart. Péringuey also described a species under the designation *aculeatus*, but this he has since recognised is not *Chlænium* at all, but a Pterostichid of an, at present, undetermined genus.

In addition to the species enumerated above, the Collection contains two further species of this group (a male and two females of one and two pairs of the other), which I believe to be new and describe below.

The species *C. oodioides*, Chd.=*Oodes puncticollis*, Boh., is quite unknown to me as well as to Dr. Péringuey, who states in reference to it that the type is no longer in the Stockholm Museum. It is very probable that it is not a *Chlenius* at all, but a *Systolocranius*, which, if it is truly referable to Boheman's *Oodes puncticollis* (page 161, Ins. Caffrariæ), the description certainly suggests it to be.

To assist in the determination of the new with the previously described species of the group, the following brief table may be useful:—

- |   |                                  |
|---|----------------------------------|
| 1(10). Colour black; legs, palpi, and antennæ wholly reddish.   |                                  |
| 2 (7). Legs and antennæ longer, the latter filiform.  |                                  |
| 3 (4). Size 12½–13 mm.; sexes alike; prothorax trapeziform, hardly sinuate laterally, densely punctate; puncturation beneath sparse and fine; elytra subopaque, intervals nearly plane, shagreen-punctate .....                   | <i>C. piceus</i> , Chaudoir.     |
| 4 (3). Size smaller (10–11 mm.); males shiny; females—elytra subopaque; prothorax narrower, more sinuate laterally above posterior angle; puncturation beneath coarser and more distributed .....                                 | <i>C. simulatorius</i> , sp. n.  |
| 5 (3). Size similar; prothorax straight laterally, smooth, very shiny, more or less sparsely punctated about base and sides; elytra hardly shiny, intervals a little raised, subcarinate, aciculate-punctate on either side ..... | <i>C. natalensis</i> , Chaudoir. |
| 6 (3). Prothorax distinctly rounded laterally, very densely and finely punctate; elytra elongate-ovate, intervals shagreen-punctate and opaque in both sexes .....  | <i>C. dichrous</i> , Wied.       |
| 7 (2). Legs and antennæ shorter, the latter a little compressed, subfiliform .....  |                                  |
| 8 (9). Prothorax, male broadly trapezoid, female more obliquely widened towards base (oodiform, very densely punctate;  |                                  |

striæ of elytra deep, intervals raised with seriate punctures on either side basally and more or less densely punctate over the whole surface. Shiny in both sexes . . . . .

*C. obliquatus*, sp. n.

- 9 (8). Prothorax trapezoid in both sexes, puncturation coarser and more scattered; elytra more narrowly elongate, the intervals more carinate, puncturation at bases similar, ridges nearly smooth. Very shiny in both sexes. . . . .

*C. trapezicollis*, Chaudoir.

- 10 (1). Knees, tibiae and tarsi, and the second joints of all the palpi more or less infuscated. Size large (16-17½ mm), prothorax transverse, more rounded from middle to apex than in preceding species, a little sinuated and constricted to posterior angles. Shiny in both sexes. . . . .

*C. erythrocnemis*, Chaudoir.

*Chlænius simulatorius*, sp. n.

Length 11-12 mm.

Black pubescent; males—prothorax and elytra shiny; females—prothorax shiny, elytra subopaque. Basal joints of antennæ and palpi and the whole of the legs light red, the other joints of antennæ and palpi a shade darker.

*Head* smooth, aciculate, a little rugose frontally on either side. Antennæ long, slender, filiform.

*Prothorax* narrow, trapeziform, nearly as long as wide, emarginate and very declivous in front, the angles sharp and projecting, only a little less wide at apex than at base, sides very gently amplified for about one-third their length, thence, except for slight sinuations of the reflexed margins, above hind angles, straight to base; base shallowly bisinuate, median groove deep and not reaching apex or base, lateral basal foveæ elongate, deep, puncturation of disc fine and moderately dense, densest about base and margins.

*Elytra* oblong-ovate, short, a little more amplified in the females than in the males, wider than prothorax at base, shoulders very broadly rounded; striæ—males deep and intervals a little convex, females nearly plane, finely and densely shagreen-punctate.

*Underside* smooth, very shiny, mesosternal parts with shallow punctures or pores, metepisterna rugosely punctulate, ventral surface aciculate-punctate about centre and apex, more coarsely and rugosely punctate at sides.

*Simulatorius* is differentiated from its very near relative *C. piceus*, Boh., on the following points. It is smaller, very shiny in the male and subopaque in the female; *piceus* is opaque in both sexes. Prothorax is narrower ( $2\frac{1}{4}$  mm. long to  $2\frac{1}{2}$  mm. wide, as against *piceus* 3 mm. long by 4 mm. wide), less ampliate below frontal angles, which are sharper, and the margins immediately above the hind angles are more broadly sinuately reflexed. The puncturation on the centre of the disc is sparser and less evenly distributed, the median groove is also shorter and deeper.

On the under surface the puncturation of the sternal parts is coarser and the venter is aciculated or punctulated over the whole surface, in *piceus* the centre part is quite smooth.

The pubescence also appears to be denser and longer, but this may perhaps be due to being fresher specimens.

Described from three examples, one male and two females, taken by me in bush among damp leaves and detritus, November 1902.

*Hab.* Mouth of Ifafa River, Natal.

*Chlœnius obliquatus*, sp. n.

Length, male  $11\frac{3}{4}$  mm., female 12–12 $\frac{1}{2}$  mm.

Black, shining, in both sexes; antennæ, palpi, and legs red, the basal joints of the two first-named a shade lighter.

*Head* very finely and densely aciculate-punctate, a little plicate on either side frontally; antennæ medium length, joints above third basal widened and compressed. Prothorax very transverse (males 3 mm. long by 4 mm. wide, females a little wider), widest at base, apex emarginate, its angles produced but not sharp, sides for a short distance below apices, males roundly, females more obliquely ampliated, thence continued straightly to posterior angles, which are obtuse; base shallowly and broadly emarginate medially, disc plane, declivous frontally, densely punctate, median line and lateral foveæ shallow and not very conspicuous.

*Elytra* at base hardly wider than prothorax, oblong-ovate, a little narrower in male than in female, apices rounded, very declivous, briefly pubescent laterally and apically, deeply striate, intervals raised and more or less irregularly punctate all over.

A near ally of *C. trapezicollis*, Chd., from which it differs in its larger size, more transverse shape, denser and finer puncturation of head and prothorax, and in the marked

differentiation of the prothoracic contours between the sexes, which in *trapezicollis* are exactly similar.

The following are dimensions of a female of *obliquatus* and a female of *trapezicollis* for comparison:—

*obliquatus*: length  $12\frac{1}{2}$  mm.; width at base of prothorax  $4\frac{1}{2}$  mm.; width of elytra  $5\frac{1}{4}$  mm.; length  $7\frac{3}{4}$  mm.

*trapezicollis*\*: length  $10\frac{3}{4}$  mm.; width at base of prothorax  $3\frac{1}{4}$  mm.; width of elytra  $3\frac{3}{4}$  mm.

Described from four examples—a pair from Malvern, dated October 1897 and September 1899 respectively, and another pair from Somkeli, dated December 1907. The only differences in these four specimens is that the Zululand pair are a little more deeply punctated about heads, prothoraces, and beneath.

*Hab.* Malvern, Natal; Somkeli, Zululand.

#### CALLISTINI.

Under the designation *Callistomimus caffer*, Boh. (*vide* page 525, vol. vii, Trans. S. Afr. Phil. Soc.), Dr. Péringuey describes a species (evidently hitherto unrecorded), which differs widely from Boheman's description of his insect under that name (*vide* page 128, Insecta Caffrariæ). Péringuey's description of this species, for which I propose the name *diversus*, shows it to be much nearer akin to *sex-pustulatus*, Boh., than to the species to which he has assigned it. The localities given for this species by its author are Estcourt, Natal, and Salisbury, Rhodesia. I have two examples (male and female) from Estcourt which agree well, allowing for some omissions, with Péringuey's (not Boheman's) description of *C. caffer*, and I have little doubt that these are the species referred to by him. From Plumtree, Rhodesia, I have four examples, which in all details agree faithfully with Boheman's description of his *C. caffer*, and these both in shape and size differ materially from the Estcourt species.

Dr. Péringuey, in his description of his *C. caffer* = *C. diversus*, mihi, omits any reference to the shape of the prothorax, and there are also other discrepancies and omissions. The following is a fuller description of this species:—

*Callistomimus diversus*, sp. n., *caffer*, Pér. (*nec* Boh.).

Length (male)  $5\frac{1}{2}$  mm., (female) 5 mm.; width  $2\frac{1}{2}$ –3 mm.

\* A female example from Piet Retief, Transvaal, loaned to me by Dr. Brauns is quite as big as my examples of *obliquatus*—length  $12\frac{1}{2}$  mm.; width at base of prothorax  $4\frac{1}{4}$  mm.; width of elytra 5 mm., length 8 mm.

Head : male steely, female greenish blue, coarsely punctate; labrum, palpi, first three joints and base of fourth of antennæ, and the legs (paler) flavescent; remaining joints of antennæ black; terminals of palpi, knees, apices of tibiæ, and, more or less, the posterior and intermediate tarsi ringed with fuscous.

Prothorax deep brick-red, cordiform, nearly twice as wide at apex as at base, frontal angles declivous, moderately sharp, sides broadly rounded, bordered and slightly reflexed, strongly contracted to basal angles, which are acute and a little recurved; disc moderately convex, densely rugosely punctate and very briefly pubescent, median line fine but distinct.

*Elytra* opaque black, briefly pubescent, oblong-ovate, base and shoulders declivous, the latter broadly rounded, finely punctate-striate, a little more deeply about the apical declivity, intervals plane, finely shagreen-punctate, narrowly or not flavescent margined, and with, on either side, two transverse bands or fasciæ, a small postmedian juxta-sutural and a sutural apical, spot.

The anterior band is very sinuate—that is to say, it projects above and below on the alternate intervals and extends, gradually widening from the third stria to the outer margin.

The postmedian transverse band is hardly sinuate; it covers the intervals 4 to 7, and is obscurely defined beyond to the edge of the outer margin. The postmedian juxta-sutural spot is situated a little above the postmedian band on the second and third intervals, and the apical sutural spot is triangular in shape. My male example has the elytra narrowly margined with flavous, but this is wanting in the female example, except for a short distance above and below the anterior transverse band.

The pectus, abdomen, and the centre line of the prosternum piceous.

From *C. cæffer*, Boh., *diversus* is differentiated by the coloration of head, prosternum, pectus, and abdomen; by the situation of the postmedian juxta-sutural spot which is well above the postmedian band, whereas in *cæffer* it is in line with and usually connected with it by a somewhat obscurely defined spot on the fourth interval.

It is considerably smaller, the puncturation of head coarser, the prothorax laterally much more constricted towards base, the elytra more shortly ovate.

It is much more nearly related to *C. sex-pustulatus*, Boh., and is only differentiated from that species on the following



somewhat minor points—i. e., by the presence of the well-defined postmedian spot on the second and third intervals, which is quite absent in *sex-pustulatus*, and by the shape of the transverse bands, which are narrower and much more irregular or jagged in outline. The palpi and labrum and basal joints of antennæ in *sex-pustulatus* are darker rufo- instead of flavo-testaceous. In sculpture and outline there seems to be nothing to separate them.

*C. gratus*, Pér., is another nearly allied species. It is a little smaller and more slender than *diversus*; the puncturation of the head is a little coarser, the prothorax less transverse, the shoulders of elytra more squarely rounded, and the colour beneath is testaceous, more or less infuscated towards centre of abdomen. Péringuey has erroneously described this species as black beneath. Four examples in my possession from Salisbury, Rhodesia, have the whole of the pectus, except a narrow infuscated central line and the coxæ, reddish testaceous. The abdomen varies from reddish testaceous to pale brownish testaceous, more or less infuscated about middle line. The fasciæ forming the elytral pattern are narrower, the lower one tends more obliquely upwards, and the apical sutural spot is wanting.

To obviate further confusion as to the identity of *C. caffer*, Boh., I append a fresh description, taken from four specimens captured by the Rev. J. A. O'Neil at Plum Tree, Rhodesia, which I have compared with Boheman's description and I am satisfied belong to that species.

*Callistomimus caffer*, Boh.

Length 6–6½ mm.; width 2½–2¾ mm.

Head and prothorax light brick-red, the latter more or less suffused with fuscous frontally and between eyes, finely and closely punctulate, and briefly pubescent; first three joints and base of fourth joint of antennæ, labrum, mandibles, palpi, and beneath testaceous to reddish testaceous. The remaining joints of antennæ black and terminal joints of palpi faintly infuscate at tips. Legs pale testaceous, infuscate at knees and apices of tibiæ.

*Prothorax* transverse, truncate at apex, angles sharp, declivous; sides roundly amplified to below middle, moderately and obliquely narrowed to basal angle, which is sharp and very slightly sinuate upwards.

*Elytra* dull brownish black with a faint greenish tinge, more or less suffused with reddish about the sutures, with two transverse bands, a postmedian and an apical sutural spot,

and the outer margin from base to apex flavescens; the anterior fascia or antemedian band extends from the third stria to the outer margin, is very irregular in outline (*i. e.*, projects towards base and middle alternately on successive intervals). The postmedian fascia is a little sinuate, and is directed obliquely from the fifth stræ to the margin, and it is usually connected, somewhat vaguely, on the fourth interval, with the juxta-sutural elongate spot on the third interval, which is obliquely in line with it.

*Hab.* Plum Tree, Rhodesia.

*Callistomimus pulchellus*, sp. n.

Length  $5\frac{3}{4}$  mm.; width  $2\frac{1}{4}$  mm.

Head, prothorax, and elytra briefly pubescent.

*Head* to line of epistome dark metallic blue; epistome, labrum, mandibles, palpi, and first three joints of antennæ reddish testaceous, the remaining joints of the latter black. Prothorax above and beneath brick-red with a central prosternal line fuscous. Legs testaceous, the knees and apices of tibiæ very faintly tinged with brownish.

*Elytra* black with on either side a subhumeral band, a postmedian ovate patch, a small apical sutural spot, and the outer margin and epipleura yellow. Pectus and abdomen piceous black.

*Head* closely and deeply punctured. Prothorax finely punctate, transverse, cordiform, truncate at apex and base, the latter produced medially, sides broadly amplified and rounded to about middle, thence gently contracted to the sharp basal angle which appears to be somewhat sinuately produced, owing to the incision below caused by the truncate projection of the median part of base; median groove faintly defined.

*Elytra* elongate-ovate, striation deep, intervals densely shagreened, shoulders and apices moderately but somewhat squarely rounded, sides hardly amplified or nearly straight.

The anterior transverse bands of the elytra are broad and very little sinuate either above or below, and cover the intervals 4 to outer margins. The postmedian patches or spots are nearly perfect ovals, occupying intervals 3 to 8, and are widely detached from the outer margins. The apical sutural spots are subtriangular, and radiate a little along the intervals. The epipleuræ and outer margins are flavescens from shoulders to apices.

Very distinct from the other species known to me.

The shape of the prothorax is exactly similar to that of *C. caffer*, Boh., except that it is produced basally. The

elytral pattern assimilates to that of *sex-pustulatus* in the more regular, less jagged outline of the spots forming the pattern and in the complete absence of the postmedian dots on the third intervals.

Described from a single male example, exact locality not recorded, but from the vicinity of Durban. There is a second example at the British Museum labelled "Umbilo, Natal (Bell-Marley), teste H. E. Andrewes," who has compared it for me with type.

*Callistomimus obscurus*, sp. n.

Size and shape of *C. amœnus*, Pér.

Head, the centre parts of the frons excepted, which is suffused with metallic blue-black, the antennæ (all but first two joints), the labrum, and mandibles red-brown. Prothorax testaceous red; first three joints (the third darker) of antennæ and the palpi reddish-testaceous. Legs pale testaceous, with knees and apices of tibiæ and tarsi infuscated.

*Elytra* black; a small ill-defined subhumeral spot between the fifth and seventh striæ, a narrow transverse postmedian patch between the fourth to eighth striæ and a juxta-median spot on third interval obscurely yellow; prosternum reddish testaceous, pectus and abdomen piceous.

*Head and prothorax* closely rugosely punctulate, not perceptibly pubescent; the latter cordiform, a little shiny and convex, lateral margins narrowly reflexed, sharply incised above and below the acute posterior angles, median part of base produced and squarely truncated; lateral basal foveæ and median groove broadly defined.

*Elytra* short-ovate, convex, about one-third longer than wide, very briefly pubescent, striate, intervals plane and densely shagreened.

The constriction above and sharp incision below the outer basal angle, together with the marked extension of the base, give a characteristic appearance to this species. As in *C. amœnus*, there is no trace of yellow along the lateral margins of the elytra, but the apices are narrowly margined with yellow, which widens into a small spot on either side of the suture.

Described from a single example taken by me September 1897.

*Hab.* Lower Unkomaas River, Natal.

*Callistomimus elegans*, Boh., and *Callistomimus guttatus*, Chd.

The patterns of the above-named species appear to be  
*Ann. & Mag. N. Hist. Ser. 9. Vol. ix.*

identical, judging by the description of the former and comparing it with three specimens of the latter in my possession. Chaudoir's description of his species, though somewhat confusing, evidently applies to my examples, which all have the two distinctive infuscated thoracic bands, though there is only the faintest trace of the frontal spot, and then in one specimen only. The elytral pattern, which varies a good deal between evanescence and extra development of some of the spots is arranged exactly as in *C. elegans*, and I think it is highly probable that Chaudoir's insect will turn out to be a mere variety or at most a subspecies of Boheman's *elegans*.

### Tribe PLATYNINI.

#### *Platynus* (*Agonum*?) *suturalis*, sp. n.

Length  $7\frac{1}{2}$  mm. ; width 3 mm.

Head, neck, and palpi deep reddish brown; prothorax testaceous red, margins paler; antennæ, legs, and beneath reddish testaceous; elytra brownish testaceous with dorsally two obscurely defined fuscous bands covering the intervals 3 and 4 and reaching from below shoulders to near apices, but becoming somewhat diffused from above the declivity.

*Head* faintly longitudinally aciculate with a hardly perceptible median sulcus. *Antennæ* long, slender, joints with the exception of the second of even length.

*Prothorax* orbicular, a little wider than long, emarginate in front, declivous and sharply rounded at angles, lateral margins broadly reflexed, evenly rounded from apex to base, no posterior angles, base sinuate and having a little above it a narrow sulcus which reaches the lateral marginal grooves on either side; disc shining, convex, almost imperceptibly transversely aciculated and with a narrow median groove from apex to base.

*Elytra* one-third wider than prothorax, shoulders broadly rounded, sides very gently amplified to beyond middle, rounded and a little sinuated to apex; striæ faintly punctulate, intervals plane and smooth, with three punctures on the third interval, the first a little below base, the second and third somewhat near together, postmedian and subapical respectively.

In size and general outline it is not unlike *P. velox*, Pér., but the prothorax is much wider and rounder and the legs are shorter.

In colour and markings it is very distinct from any of the South-African members of the genus known to me.

Described from a single example taken by Mr. Bell-Marley at Krantzklouf, Natal, July 1910.

*Platynus (Anchomenus) zuluanus*, sp. n.

Length  $7\frac{1}{2}$ –8 mm. ; width  $2\frac{3}{4}$ –3 mm.

Head, prothorax, labrum, and mandibles piceous red, the head a shade darker than the other parts; first three and tips of ultimate joints of antennæ, palpi, and legs light testaceous brown, the remaining joints of antennæ, annulets on terminal joints of palpi, the femora about knees, the tibiæ above, and tarsi at apices of joints infuscated or more deeply browned. Elytra greenish black, ænescent, very shiny, outer margins and beneath rufo-testaceous.

*Head* smooth, frons shallowly grooved on either side above epistome.

*Prothorax* narrow, as long as wide, much narrower in the posterior than in the anterior parts, apical angles declivous, prominent, moderately sharp, sides reflex-margined, gently amplified to about middle, thence sinuately narrowed to the basal angles, which are somewhat obtuse and recurved, disc smooth or hardly perceptibly aciculate, a little convex medially, lateral basal sulci elongate and parallel to margins, median groove deep reaching from apex to a little above base.

*Elytra* at base nearly twice as wide as prothorax, shoulders rounded, sides (male) very slightly, (female) a trifle more amplified, broadly rounded to and a little sinuated before apices, very finely striate, intervals plane and smooth, seriate punctures on third intervals very faint, one near base impinging on the fourth stria, a second a little postmedian, and two others near together on the apical declivity.

In the narrowness of the elytra, not in its contour, it approximates to *P. alacer*, but in its less elongate legs and other characteristics it is far removed from that species. Of the South-African species known to me its nearest allies are *P. lætulus*, Pér., and *P. fullaciosus*, Pér.

III.—Some new Species of Earthworms belonging to the Genus *Glyphidrilus*. By C. R. NARAYAN RAO, M.A., University of Mysore, Bangalore.

ACCORDING to the published records, the following species represent the family Glossoscolecidae in India: *Pontoscolex corethrurus*, *Criodrilus lacuum*, *C. bathybatēs*, *Glyphidrilus annandalei*, and *G. tuberosus*. This paper discusses four

new examples assigned to the genus *Glyphidrilus*, mainly from Coorg and Shimoga (Mysore). Through the courtesy of the Director of the Zoological Survey of India, I was enabled to examine in June 1918 the above forms belonging to the Indian Museum, and more recently I was given the opportunity of recomparing the examples of *Glyphidrilus* with my own material. I am thankful to the Museum authorities.

The two new species, *G. rarus* and *G. saffronensis*, of which there are a large number of sexually mature forms in the collection, are without a trace of clitellum, puberty-tubercles, and latero-ventral wing-like expansions or ridges of the body-wall. Besides, the seta-distances and the size of the setæ vary to an extraordinary degree in the four species, and I am of opinion that these characters, which are associated very largely with growth and sexual maturity, cannot be relied upon as a very safe diagnostic feature. In a few important particulars the generic characters of *Glyphidrilus* have to be recast and written thus :—

#### Genus GLYPHIDRILUS, Horst.

1900. Michaelsen, "Oligochæta" in 'Das Tierreich,' p. 459.

Prostomium pro- or zygo-lobous. The first 12–22 somites are circular in cross-section, hard and large; the body behind is four-cornered (in preserved specimens). Anus dorsal and large, surrounded by a few extremely short segments and a variable number of them in front also, are marked off from the rest of the body by their shortness. Setæ on the middle of body are invariably larger; the seta-distance  $dd = < \text{or} > aa$ . The clitellum, if present, is marked by the possession of puberty-tubercles and latero-ventral ridges or wing-like expansions of the body-wall. These, together with the clitellum, may be absent. The position of male aperture varies, is not easily made out, and is placed as a rule within the clitellum. The spermathecal pores, either single or groups, occur in front of the male aperture, in the intersegmental furrows from two to six somites within the seta-space  $bc$ . A well-developed gizzard in front of septum 8–9 occupying segment 8 or  $7\frac{1}{2}$ , 8 and  $9\frac{1}{2}$ . Calciferous glands absent; œsophageal pouches in somites 9 and 10 may or may not be present. Two pairs of testes and funnels in somites 10–11, and usually four pairs of seminal vesicles in segments 9–12. A pair of ovaies and ovisacs in segment 13.

Twelve species are now known, of which six occur in India. Found in close proximity of fresh water.

The Indian examples may be recognized on the basis of the following characters.—

- 1 Clitellum segments 17, 18-36, 41, latero-ventral ridge on wing-segments 27, 29-32, 33, puberty-tubercles three rows in front of the ridge, gizzard segment 8, slightly extending into 7 . . . . . *G. annandalei*, Mich
- 2 Clitellum segments 14, 15, 16-28, 30, latero-ventral ridge segments 20-23, 24 the ridge may be foliated into a cauliflower-like outgrowth, puberty-tubercles in three sets, an anterior on segments 10-12, a middle on 17, 18-19, and a posterior on 24-28, gizzard segment 7 extending into 8 . . . . . *G. tuberosus*, Steph
- 3 Clitellum segments 13, 14-38, latero-ventral ridge segment 25-32, 32½, puberty-tubercles three rows in front of ridge, gizzard segment 8 extending into anterior half of segment 9 . . . . . *G. fluviatilis*, Rao
- 4 Clitellum segments 14-35, 48, latero-ventral ridge segments 24-32, 36, and may be occasionally repeated on segments 40-45 on one or both sides, puberty-tubercles three or only two rows in front of ridge, gizzard segment 8 . . . . . *G. elegans*, Rao.
- 5 No clitellum, no puberty-tubercles, no latero-ventral ridge, or a feebly-marked one between seta-line *bc*, segment on the middle of body as large as or larger than segments 7-12, gizzard spherical, segment 8, no oesophageal pouches . . . . . *G. raius*, Rao
- 6 No clitellum, no puberty-tubercles, no latero-ventral ridge, segments on the middle of body considerably less than half the width of segments 7-12, gizzard cylindrical in segments 7½-9½, oesophageal pouches in segments 9-10 . . . . . *G. saffionensis*, Rao

*Glyphadrilus fluviatilis*, sp. n.

There are more than forty large and sexually mature specimens in the collection, with the median row of puberty-tubercles ranging from 3 to 14, and their mode of occurrence is very arbitrary.

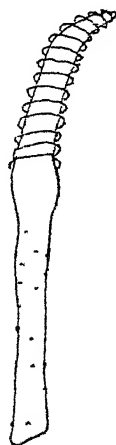
*External characters*.—The longest specimens measure 270-275 mm.; circumference in the preclitellar region 4½ mm.; width in the region of puberty-tubercles 5½ mm.; across the clitellar wing 1 mm.; postclitellar region 4 mm.

The anterior part of the body down to segment 16, 18 is round, and behind it is four-cornered; the terminal part of the body may be swollen or narrowed into a cone. The

part of the body which is quadrilateral in cross-section bears dorsal and ventral wide and lateral, sometimes deep canals. Total number of segments 270-385. The pre-clitellar segments, nearly twice the size of the postclitellar ones, bear a number of prominent secondary annular ridges and grooves. The clitellar segments with the latero-ventral wings are the broadest and soft, bearing ventrally irregular grooves and ridges. The number of segments surrounding the anus can hardly be counted, owing to extreme shortness.

Anus a large longitudinal slit, dorsal in position, borne on a swollen cone or on the unmodified posterior region. Prestomium pro- or zygo-lobous.

Fig. 1.



A seta (*b*) from the middle of body of *Glyphidrilus fluviatilis*,  $\times 75$ .

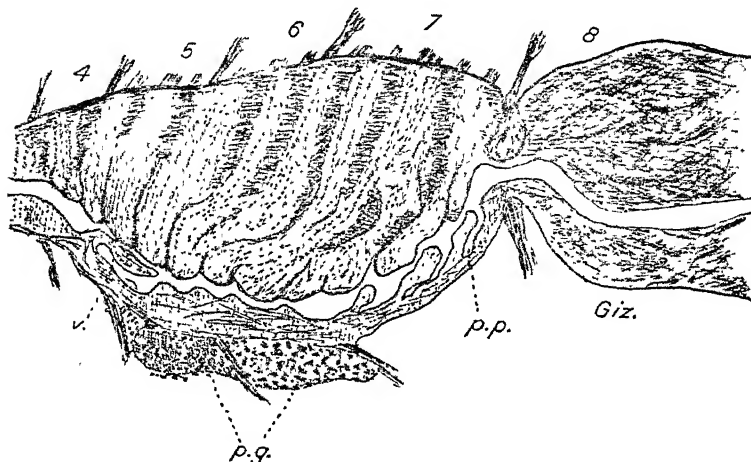
Dorsal pores absent.

In the preclitellar region the seta-distance is  $aa$ , equal to or slightly less than  $bc$  or  $dd$ ;  $bc = dd$ ;  $ab = cd$ . In the post-clitellar region  $aa : ab : bc : cd : dd = 2 : \frac{1}{2} : 1 : \frac{1}{2} : 1\frac{1}{2}$  or 2. A seta from the preclitellar region measures nearly 0.75 mm. long and 0.12 broad. The skin is raised in a tent-like fashion over the seta in the middle and hinder part of body. The projecting part of the setæ is ornamented by delicate annulations, and the stem embedded in the follicle bears a few irregularly-disposed spines, and the whole structure is marked by fine striations, the distance between any two striæ being 1150  $\mu$ . The first segment is free.



Traces of clitellum begin on segment 13, but become strongly marked on segments 14-33, 36 (=23 somites). The clitellar somites 25-32½ bear latero-ventral wing-like expansions with either a straight or greatly-folded margin. The limits of the clitellum at either end are indistinct. The

Fig. 2.



Vertical longitudinal section of pharynx and gizzard of *G. fluviatilis*. The section shows the immense dorsal thickening of the pharyngeal wall, the ventral thrown into folds so as to give rise to pouch-like sacs.

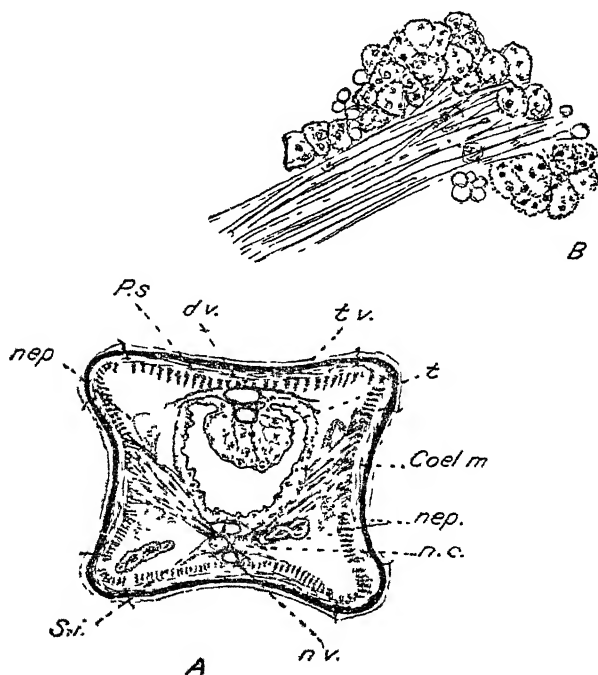
*Lettering to figs. 2-4.*

*amp.c.* = ampulliform clitellar cells; *b.v.* = blood-vessel; *Coel.m.* = coelomic muscles with clumps of cells on them; *c.t.* = connective tissue; *d.v.* = dorsal vessel; *g.c.* = glandular cells; *Giz.* = gizzard; *m.* = muscular system of body-wall; *nep.* = nephridia; *nep.c.* = nephridial cells, showing the characteristic form and position of nucleus; *n.c.* = nerve-cord; *n.v.* = subneural vessel; *nip.* = teat of puberty-tubercle; *ob.m.* = oblique muscle-fibres; *p.g.* = pharyngeal gland; *p.p.* = pharyngeal pouch; *p.s.* = peritoneal sheath; *r.* = rim of puberty-tubercle; *ring.m.* = circular muscles of the rim; *s.* = skin; *s.i.* = subintestinal vessel; *t.* = typhlosole; *t.v.* = typhlosolar vessel; *v.* = valve-like fold of pharynx; *wt.* = wide tube free in fig. 4 B and clogged by degenerate nephridial cells in fig. 4 C; *nt.* = narrow tube free in fig. 4 B and clogged by degenerate nephridial cells in fig. 4 C.

puberty-tubercles occur in three rows in front of the clitellar fold, and their number and relation to somites are irregular. The mid-ventral row commences on segments 13, 16, extending up to segments 23, 24. The number of lateral papillæ

is fairly constant, the first occurring on the somite 14, though there may be lop-sided individual variations. Behind the chitellar wing segments 33-35 bear lateral tubercles, and median ones occur on segments 38-40. The disposition of the lateral papillæ is interesting: the first three on either

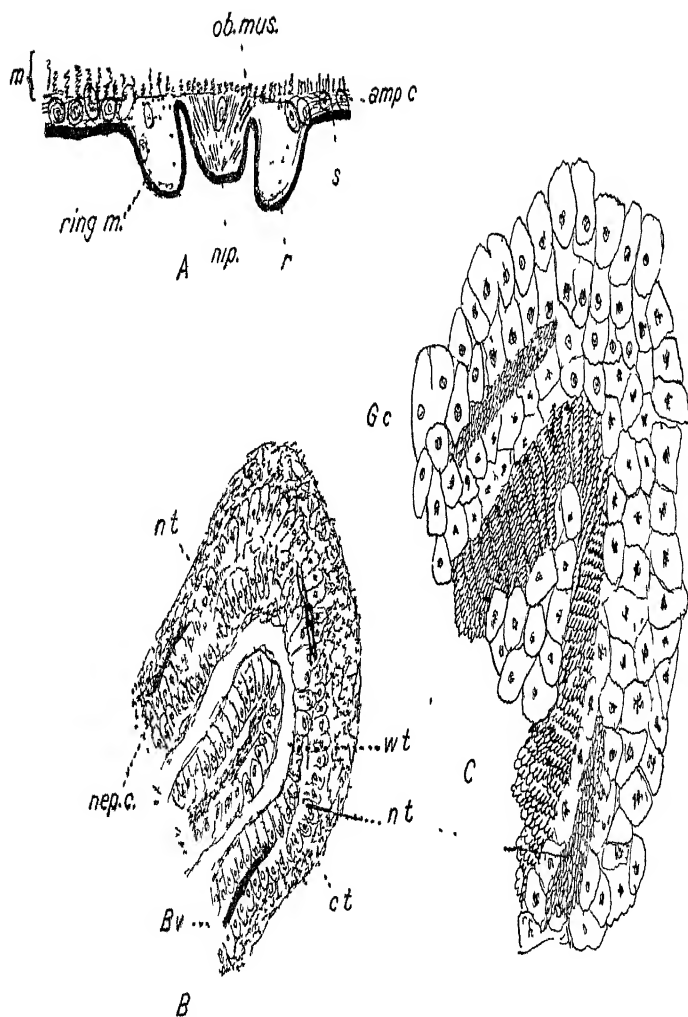
Fig. 3.



- A. Transverse section of the middle of body of *G. fluviatilis*, to show the relation of the coelomic muscles and the viscera. In the ventral coelomic chamber lie the nephridia, nerve-cord, and the subintestinal and subneural vessels.
- B. Stained preparation of the coelomic muscles, showing the clumps of cells and corpuscles of the coelomic fluid. The double and trinuclear nature of the cells is clearly seen.

side are in seta-line *bc*, 4 and 5 are shifted dorsalwards lying in seta-line *cd*, and the series from the sixth is again shifted to seta-line *cd*. Each tubercle is placed on the posterior margin of the somite to which it belongs, and may be so large that the tubercles form a continuous row. Each

Fig 4.



A Vertical section through the median puberty-tubercle, showing the muscular arrangement of the test and annular margin of *G. fluvialis*.

B and C Horizontal section of the intestinal lobe of nephridia of segments 30 and 14 respectively of *G. saffronensis*, C shows the nature and extent of modification where it occurs

papilla consists of a circular elevated ridge with a central nipple, separated from the former by a deep moat all round. Occasionally there may be two such nipples on a papilla, when it becomes quadrilateral in outline. If, as occasionally happens, the papillary somites should bear secondary annular ridges, these latter become conspicuous bars connecting the three rows of tubercles on the somite, which in cross-section is more like a segment of a circle. In sectional preparations (fig. 4, A), the tubercle is seen to be composed of circular muscle-fibres in the outer rim, and in the central nipple occur an outermost circular layer and an inner band of vertical muscles, which converge towards the apex in an oblique manner from all round the neighbourhood of the outer rim. There are no sensory cells of any kind on them, and only a few large oval glandular cells, occurring chiefly in the trench. Judged from their structure, there can be little doubt that the tubercles act as organs of adhesion in a sexual act, and when we consider the fact that the surroundings in which these worms live are likely to be suddenly inundated, the need for suckorial organs of some sort becomes all the greater. The lateral clitellar wings are muscular structures with the outer transverse and the inner longitudinal bands studded with the oval ampulliform gland-cells. Lying in between the muscle-bands of both sets are to be found branching connecting-tissue fibres, which enable these flaps of skin to be stretched out fairly widely.

No genital pores can be made out, except in sections. Spermathecal apertures occur in intersegmental furrows. Male orifice in the intersegmental furrow 21/22 nearer to seta-line *b*.

Opening of the oviduct segment 13 between seta-space *aa*. Nephridial pores large between *bc*, very well marked behind segment 12, and inconspicuous anteriorly.

*Colour*.—In spirit-specimens the colour is a dark grey, with occasionally traces of orange on the anterior part of the body. In the live specimens the greater part of the postclitellar region is yellow with a dark, broad, dorsal and frequently ventral band. The whole clitellar portion is grey or even white, and the body in front is yellowish red.

*Internal organisation*.—The first recognisable septum 3/4 is composed of a few muscle-bands only, 4/5 better developed. Septum 5/6 is only slightly and 6/7–14/15 very thick. Others are tender.

Dorsally the pharyngeal muscles are densely developed, arising from the posterior border of septa 4/5–7/8, and

inserted obliquely forwards. They form a dense matting over the pharynx. Ventrally the bands are separate and more strongly developed. The pharynx (fig. 2) occupies somites 3-7. Its dorsal wall is enormously developed, and tongues of muscles dip into the cavity and almost fit into corresponding depressions on the floor. The ventral wall at the level of the fourth segment is raised into a semilunar valve-like fold, whose presence is marked outside by an intucking of the wall. The ventral wall of the pharynx in somites 6 and 7 is raised into vertical folds, simulating the pouch. The nephridia of segments 5-6 are all fused together to form a single median structure, closely applied to the ventral wall of the pharynx. They are modified into flat glandular bodies, in which the small nephridial cells are united to become large polygonal syncytial cells in the main lobes. They have no nephridiopores, and just behind the semilunar fold (segment 4) is a small aperture, which can be traced to these pharyngeal glands; in a series of sections the communicating channels lie closely adherent to the under surface of the pharyngeal wall. The gizzard is in segment 8, slightly extending into segment 9. The intestine commences in segment 14. There is a typhlosome.

Below the dorsal vessel lies a typhlosolar vessel, which runs up to the genital somites, where it attains the thickness of the superior vessel, finally entering the pharynx. The last heart is in segment 12. There are subintestinal and subneural vessels. A lateral vessel is present only occasionally. The secondary segmental sheath, in which the dorsal vessel is enclosed in segments 18-25, is a flat somewhat loose pouch filled with coelomocytes and blood-corpuscles. I have not been able to make out any communication between these pockets and the body-cavity.

The nephridial system consists of a series of very large meganephridia, becoming most conspicuous from somites 14. In front they are only feebly developed—sometimes disposed in the form of arches over the alimentary canal, or are tucked under in the form of tufts. The nephrostomes are large club-shaped structures, in which the diameter of the ciliated funnel is only slightly wider than the funnel-tube. In segments 24-32, of the majority of examples dissected and examined, are found small vesicles, not unlike the spermatheca in the anterior somites, in close relation with the nephridia of these segments. The vesicles, which are 3-4, lie in the seta-line *a, b, c, d* on either side close to the posterior surface of septa, and are connected with the main lobes of the nephridia only by muscular attachments.

Apparently they have no ductules leading them to the outside world, for none can be made out in sections. In respect of microscopic structure, their excessively thin wall is composed of cubical large cells and a few muscle-fibres circularly disposed. The vesicles were empty. They must be degenerate spermathecæ, unusually placed far behind.

The male organs comprise four pairs of large testicular sacs in segments 9-12. Each vesicle is a greatly lobulated, pyriform, spherical or oval organ, the anterior two are attached to the hearts in whose loop they lie just in front of septa 9/10 and 10/11, and the hinder two are attached to the posterior face of septa 10/11 and 11/12. I have noticed, in about three out of eight examples dissected, a fifth pair of seminal vesicles attached to the anterior surface of septum 11/12. Seminal funnels are large, placed in segments 9 and 10-11 attached to the sacs. Testes are small brush-like organs, mostly free, attached to about middle of the anterior surface of septa 9/10 and 10/11. There are no prostates. The male aperture could be made out only in sectional preparations in the intersegmental furrow 21/22 nearer to seta-line *b*.

There is a single pair of large spermathecæ in segment 14. Each is a stalked pyriform organ without diverticula. The duct enters the posterior face of septum 13/14. In addition, there may be a variable number of spermathecæ on each side, behind segment 14 in the seta-lines *a*, *b*, and *c* close to the posterior surface of septa 14/15, 15/16, 16/17. They are sessile, almost buried in the thickness of the body-wall. Each of these structures differs from the ampulla referred to in connection with the nephridia by the muscle-fibres forming distinct spiral bands. In vertical sections of the body-wall in this region the apertures are made out. Asymmetrically situated behind segment 16 are occasional spermathecal vesicles, either only on one or both sides.

The ovary and ovisacs are large, more or less spherical, soft, lobulated bodies, in segment 13 attached to the posterior surface of septum 12/13. No oviduct was made out. Female pore on segment 13 within the seta-space *aa*.

*Locality*.—Sandy banks of Rivers Harangi, Madapur (Coorg); Cauvery, Fraserpett (Coorg), and Sheravathy, Shimoga (Mysore).

Type-specimen in the British Museum.

Syntypes in the Hamburg and Indian Museums.

*Remarks*.—This species and the three others described in this paper do not in the living condition possess a four-cornered body behind segments 12 or 13, but nearly a flat

oval one. It is while fixing the animals that the body becomes four-cornered, and in the struggles snaps occur at different parts, leading to complete separation. The quadrilateral nature of the body is produced by the sudden contractions of the transverse bands of coelomic muscles, which extend from seta-space *bc* to below the intestine. These muscles (fig. 3, A & B), which start from the body-wall in the median line, spread outwards in the form of a cone on either side, and a pull on the body-wall on the sides accounts for the lateral canals and dorsal and ventral corners. The contraction of the vertical muscles of the septa, which extend beyond the grooves on either side of the body-wall, would produce the dorsal and ventral canals. The secondary sets of coelomic muscle-bundles do not occur in front of the segment 14, and hence this region remains round.

But the most interesting fact connected with these muscles is that they almost form, being connected here and there in their course by patches of peritoneal membrane, secondary ventral chambers, in which the nephridia are lodged. They have to be disengaged from these chambers for a more detailed examination. Numerous bubbles of air escape from these secondary chambers, as in other freshwater species, while the worms are opened and spread out, and, where the pressure has not ruptured the investing membrane of the ventral coelomic chamber, very large air-bubbles are noticed, being entangled within the muscular mesh. Such air-bubbles are found throughout the worm. The chamber on one side communicates with its fellow on the opposite side below the intestine and the nerve-cord, the associated vessels and the nephridia lie within the secondary cavity. In cross-section the chambers look like two cones, their apices meeting in the middle. The upper wall is composed of several bands of muscles, held together imperfectly in most places by the reflected portion of the peritoneum from the intestine. On the body-wall (*bc*) the bundles of muscles at their point of insertion spread out in the form of a fan. Occurring in the narrower middle portion of the chamber, and also in the outward part, are clumps of large polygonal cells with one or more deeply staining nuclei associated with the muscle-bundles. Mixed up with these clumps are coelomocytes and a fine plexus of blood-capillaries. In any teased and stained preparation of the muscle-fibres, the cell-clumps are a striking feature, and occur uniformly. I am unable to trace the source or determine at present the nature of the origin of these cells, which may be due perhaps to the proliferation of peritoneal cells, which

they resemble closely except in size. In view of the absence of the dorsal pores, and consequently the complete shutting off of the segmental cavities from the outside world, it is only reasonable to associate in some sort of manner the uniform occurrence of the bubbles with the cell-aggregates of the secondary chambers. In other words, the ventral portion of the coelomic cavity perhaps acts as a hydrostatic chamber, which in worms whose environment is susceptible of being frequently inundated by sudden floods must be extremely of a useful character.

*Glyphidrilus elegans*, sp. n.

*External characters.*—The largest specimens measure 136 mm.; number of segments 186–270; circumference of body about segments 9–14  $3\frac{1}{2}$  mm. where the body is round; from segments 18–24 5 mm. across the body where it is flat; between the inner borders of the clitellar wing 5.5 mm., here the body is thick and flat. Behind the body gradually narrows and is four-cornered, with the dorsal, ventral, and lateral canals. Sometimes the dorsal depression may extend forward up to segment 13; segments 7–13 are broad and those behind are extremely short, nearly half or less than half of the anterior ones. Segments in the posterior part of the body only gradually become short and can be counted up to the anus, which is dorsal and terminal. The anterior preclitellar segments have secondary annular ridges and grooves.

Prostomium zygalobous.

Dorsal pores absent. Nephridial pores from behind segment 12 in seta-space *bc*.

In segments 24–32  $aa=2\frac{1}{2}ab$  and  $=2ab$  both in front and behind this region, and gradually becoming less than  $2ab$  both ways;  $aa$  is greater than  $bc$  or  $dd$ ;  $ab=cd$ .

The clitellum is marked from segments 14–35, 48 (=22–35).

The genital markings are three, or only two rows of puberty-tubercles. The median, when present, commences from segments 12–13, and quite variable in number (7, 12), and the laterals, which are uniform in their occurrence, begin on segment 13 extending up to segment 24. Behind the puberty-wing, the lateral series may be continued on segments 32–36 on one or both sides and the median ones on segments 41–42. Each of these tubercles, which in point of disposition and microscopical structure resembles the foregoing species, differs from them in a marked manner by their oval or transversely elongated shape. The secondary annular ridges from segments 18, 22 are very strongly



developed on the ventral surface, and connecting the three tubercles on a segment constitute a characteristic feature. Each tubercle occupies the whole width of the segment, and consequently touches one another so as to form a continuous structure. In the case of the lateral tubercles from segments 12-24, there is a clitellar ridge, dorsal to the tubercles and becoming continuous with the broader wing from segments 25-32, 36, and occasionally repeated on one or both sides on segments 40-45. The border is greatly foliated. No genital pores can be made out except in sections.

*Colour.*—In the living condition this is a beautiful worm, covered by more than one vivid colour. The anterior part of the body down to segment 18 is bright orange, and from behind down to about segment 40 it is a warm yellow. Dark dorsal and ventral bands occur. The yellow posterior part of the body becomes rather dirty. The mid-clitellar region is deeply red, while the tubercles and the wing are white. In the spirit-specimens the yellow and even the red may be preserved in varying degrees.

*Internal organisation.*—Septum 6/7 moderately and 7/8-10/11 very thick. Septum 4/5 is the first recognizable one.

The pharynx extends up to segment  $6\frac{1}{2}$  and is thrown into pouch-like sacs in segment 7. Gizzard spherical, very large in segment 8. Intestine begins in segment 14. A typhlosome is present. Pharyngeal glands present, having the same relation and structure as those of the previous species.

Dorsal vessel single. Last heart in segment 11 and an additional one frequently in segment 12.

Meganephridia commencing from segment 12. None in front. They are enclosed in the ventral secondary coelomic chambers.

*Male organs.*—There are four pairs of seminal vesicles in segments 9-12, those in 9, 10, and 12 being conspicuous. They are directly attached in the usual way to the anterior and posterior surfaces on septa 9/10, 10/11, 10/11, and 11/12 respectively. The vesicles are irregularly spherical bodies, soft and lobulated. No prostates.

Testes and funnels in segments 10-11 both conspicuous and easily made out. Male aperture in intersegmental furrow 27/28 on seta-line *b*.

Ovisacs and ovaries situated in segment 13 on the dorsal vessel, each is a large flat body, loosely attached to the posterior surface of septum 12/13. Oviducts not identifiable. Female orifice segment 13 within *aa*.

Spermathecae are situated in segments 13-16. They are

minute, sessile, subspherical bodies embedded in the body-wall. In each segment there are five on each side, the innermost row internal to seta-line *aa*, and the others on seta-lines *a*, *b*, *c*, *d*, with corresponding intersegmental spermathecal apertures. Lop-sided variations in regard to the spermathecae are common, the additional ones occur in segments 17-18 in the seta-line *b*. The supra-oesophageal ganglion occurs in segment 4.

Type-specimen in the British Museum.

Syntypes in the Hamburg and Indian Museums.

*Locality*.—Sandy islets in the Cauvery, Dubari forests. Fraserpett (Coorg); banks of Sheravaty, Shimoga (Mysore).

*Glyphidrilus rarus*, sp. n.

*External characters*.—Average length of three longest specimens 205 mm.; maximum thickness 4 mm., which may increase slightly behind or suddenly fall from behind segments 9-12. The last segments 20-32, immediately in front of anus, become very short, and are marked off from the rest of the body in front. Average number of segments 290; segments 6-10 large; those in the middle of the body equal to these or only very slightly shorter. The number surrounding the anus is too short to be counted. Body round for about twelve segments, behind it is high and four-cornered, with broad dorsal, ventral, and lateral canals; segments 3-14 bear secondary ridges and annulations.

Prostomium large, zygodinous. Mouth is a crescentic opening, rather ventral. Anus a narrow longitudinal slit, dorsal in position.

Dorsal pores none.

The seta-distance in front of segment 12 is  $aa=2$ ,  $ab=1$ ,  $bc=1\frac{1}{2}$ ,  $cd=1\frac{1}{2}$ ;  $dd=2$ ; in the middle of body  $aa=2\frac{3}{4}$ ,  $ab=1\frac{1}{2}$ ,  $bc=1\frac{1}{2}$ ,  $cd=1$ ,  $dd=2\frac{3}{4}$ ; in the terminal modified portion of body  $aa=1\frac{3}{4}$ ,  $ab=\frac{3}{4}$ ,  $bc=1$ ,  $cd=\frac{3}{4}$ ,  $dd=1\frac{3}{4}$ . The first segment is free. Setae on middle of body very large.

No trace of clitellum, although all the numerous specimens in the collection are fully mature and the sexual glands are well developed. Puberty-tubercles and clitellar wing-like expansions are also absent. The latter may be feebly formed over somites 25-32 on the outer side of seta-line *b*.

Nephridial pores in the intersegmental furrows in the middle of seta-space *bc* throughout the length of body from segment 12.

None of the spermathecal apertures can be made out

easily, except in sections in the intersegmental furrows 13/14, 15/16 on seta-line *b*. Male and female apertures cannot be identified.

*Colour.*—In the live specimens the whole body is a pale grey, or even slightly brownish in some, with the usual dark dorsal and ventral bands. There is no colour-change in the preserved material.

*Internal organisation.*—The first recognisable septum is 4/5; septa 7/8–10/11 very thick, those of 11/12–14/15 fairly thick. Those of 4/5–6/7 are thicker than 16/17.

The pharyngeal muscles are very strongly developed in somites 6–7, though the ventral bands are few. The pharynx is a spherical, strongly muscular chamber occupying somites 3–6. Pharyngeal wall in segment 7 thrown into pouches. A well-developed spherical gizzard in segment 8. An oesophageal pouch may be present in segment 9. The intestine begins in segment 13, and in 14 the intestinal wall is thick, white, and spherical, so as to simulate a secondary posterior gizzard. There is a typhlosole, but no pharyngeal glands.

The dorsal vessel is a stout tube of uniform thickness throughout. There is a typhlosolar vessel which comes to the surface of the intestine at the level of segment 14, and is continued forwards in the form of an independent vessel entering the pharynx anteriorly. The last heart is in segment 11. A lateral longitudinal vessel, about the thickness of the dorsal vessel, extends from the anterior end backwards in seta-line *b*. It is suddenly deflected inwards at about the level of somite 13, or may be continued in the same seta-line as far behind as segments 46–60, becoming greatly attenuated in its course. There is only a sub-intestinal vessel.

The nephridia begin in segments 14–15.

*Male organs.*—The testes and funnel in segment 10 not identifiable, but made out in segment 11. There are four pairs of seminal vesicles, irregular in shape and independent of the loops of the heart. The anterior ones are attached to the anterior face of septa 10/11 and 11/12. There are no prostates. Male aperture in the intersegmental furrow 21/22 on seta-line *b*.

A small ovary and an egg-sac are attached to the posterior surface of the septum 12/13 dorsal in position. No oviduct. Female orifice on segment 13 within *aa*.

No spermatheca could be discovered in any of the three specimens dissected. In one, however, a small whitish pear-shaped organ occurred in seta-line *b*, segments 14, 15 on

both sides perhaps representing rudimentary spermathecal structures.

Type-specimen in the British Museum.

Syntypes in the Hamburg and Indian Museums.

*Locality*.—Sandy banks of the Harangi, Madapur (Coorg), and of the Cauvery, Dubari forests, Fraserpett (Coorg).

*Glyphidrilus saffronensis*, sp. n.

*External characters*.—Average length of three longest specimens 135 mm.; maximum thickness 5 mm., which is fairly the thickness throughout, except the posterior one-eighth, which gradually tapers towards the anus. Average number of segments 298. Segments in the middle of body about one-third the width of segments 6–12, and those immediately in front of the anus about half the width of former.

Anteriorly the body is round, behind it becomes four-cornered with feebly lateral canals, the dorsal and ventral ones, however, are strongly marked. Secondary annular ridges may be wanting or may be limited to the occurrence of one on each segment, mainly anteriorly.

Prostomium large, zygalobous. In the preserved specimens the anterior dorsal wall of the pharynx may project beyond the mouth. No dorsal pores. Anus, a dorsal longitudinal slit, wider at the terminal part with tumid lips.

The seta-distance in front of segment 12  $aa=1\frac{1}{2}$ ,  $ab=1$ ,  $bc=1\frac{1}{2}$ ,  $cd=1$ ,  $dd=1\frac{1}{2}$ ; in the middle of body  $aa=2$ ,  $ab=.75$ ,  $bc=1\frac{1}{2}$ ,  $cd=.75$ ,  $dd=2$ ; in the terminal modified portion of body  $aa=1$ ,  $ab=.50$ ,  $bc=.75$ ,  $cd=.50$ ,  $dd=1$ .

No trace of clitellum, all the numerous examples in the collection being sexually mature; puberty-tubercles and clitellar wing absent.

Nephridial pores, in the intersegmental furrows, nearer to seta-line *c* throughout the length of body from segment 18.

Spermathecal apertures made out with difficulty in the intersegmental furrows 13/14–16/17 nearer to seta-line *b*. Sometimes only one orifice, that of 13/14 may be present. Male aperture on the intersegmental furrow 27/28 in the seta-space *ab*; female opening not discoverable.

*Colour*.—In the living condition the whole body is a vivid lemon-yellow, with reddish and whitish patches on the anterior somites. The terminal modified portion of body white. Dorsal and ventral dark bands. In the preserved specimens the colour is either a pale yellow or grey.

*Internal organisation*.—The first recognisable septum is 4/5, which and the succeeding two are strongly muscular.

Septa 7/8 and 10/11 are very thick and 11/12 only slightly so.

The oblique pharyngeal muscle-bands spring from the posterior margin of somite 7 ventrally, and pass inwards and forwards through septa 6/7 and 5/6 to be inserted into the ventral pharyngeal pit. The dorsal muscles form a closer matting structure, where the dorsal anterior wall of the pharynx is shot out, the whole pharynx appears on dissection a tubular structure, otherwise it is a spherical organ occupying somites 3-6.

The whole of the ventral wall of the pharynx is sacculated, becoming a distinct pouch in somite 7. The gizzard is very strongly developed; it is a long tubular structure, lying in somites  $7\frac{1}{2}$ , 8,  $9\frac{1}{2}$ , and accordingly septa 7/8 and 8/9 are displaced by the length of half a somite. Well-developed oesophageal pouches may occur in somites 9 and 10, the anterior being better developed. There is a typhlosole, the intestine beginning in segment 14. No salivary glands.

The last heart is in segment 11. A typhlosolar vessel and a lateral longitudinal vessel are present, the latter occasionally very feebly developed.

The nephridia commence in segments 12-13. Those in 13-16 are excessively large and are brownish in appearance. Frequently the nephridia may have a similar colour in one or more lobes. Structurally also there is modification. In the anterior nephridia (13-16) the lobes comprise very large oval cells, with deeply staining central nucleus. The protoplasm stains less easily. Clearing with glacial acetic acid reveals nothing, except that the protoplasm of the cells appears clearer and more granular. In sectional preparations, (fig. 4, B & C) the ordinary nephridial cells appear degenerate and block the system of draining-canals, the whole organ thus becoming a more solid structure with a rich plexus of blood-capillaries. There is little doubt that the larger cells are of secondary origin, though their source is doubtful. In none of the teased or sectional preparations of these modified nephridia could the occurrence of organic debris be found, the entire structure looking under the microscope not unlike that of an egg-sac. The exact nature of the function fulfilled by these greatly modified nephridia is problematical. The other nephridia in the middle of the body have the usual structure and disposition.

*Male organs.*—Two pairs of testes and two large seminal funnels in segments 9 and 10. The seminal vesicles, which are four, are unequally developed, and in point of attachment and position follow the usual rule (segments 9-12, the

first two attached independently of the hearts, to the anterior surface of septa 9/10 and 10/11, and the last two to the posterior face of septa 10/11 and 11/12). No prostates.

A pair of ovaries and ovisacs in segment 13 attached to the posterior surface of septum 12/13. No oviduct can be made out. Female opening, as made out in transverse sections, on segment 13 within seta-space *aa*.

Spermatheca not present.

The supra-oesophageal ganglion is in segment 4. The two halves of the nerve-cord remain separate, being enclosed only in a connective-tissue sheath.

Type in the British Museum.

Syntypes in the Hamburg and Indian Museums.

*Locality*.—Margins of pools in the forests of Dubari, Fraserpett (Coorg); river-beds of the Cauvery, Dubari (Coorg).

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#### IV.—*An Account of the Castniinæ in the Collection of Madame Gaston Fournier [Lepidoptera].* By PERCY I. LATHY, F.E.S.

[Plate IV.]

SINCE the appearance of M. Houlbert's fine work on the *Castniinæ* (Etud. Lépid. Comp. xv. 1918) the attention of Lepidopterists has naturally been turned towards this interesting family. Mr. Talbot, in his review of this work (Novitat. Zool. xxvi. pp. 28–35, 1919), and Lord Rothschild (*loc. cit.* pp. 1–27) have already added considerably to our

knowledge by describing several new species and subspecies, and also by correcting a certain number of errors that were bound to be found in a work of such magnitude as that of M. Houlbert.

As Madame Fournier's collection of Castniinæ now ranks among one of the finest of this family, it has occurred to me that an account of the species it contains may be of interest to Lepidopterists, especially as in it I have discovered a new species and several new subspecies, and also am able to point out variation that exists in some species, that have hitherto been exceedingly rare in collections, of which Madame Fournier has long series.

I have given a complete list of the specimens contained in the collection, so that any Lepidopterist desiring to visit it in order to study this family may know at once what material he will have to work upon, and at the same time it will serve to show the numerous gaps that still remain to be filled.

A curious feature that I have noticed among some species of the Castniinæ is the resemblance of males to females, and *vice versâ*—I allude, of course, to the non-dimorphic species, such as *Ypanema decussata*, *Xanthocastnia evalthe*, etc. Usually the females in these species have the apex of fore wing slightly more rounded than in the males; but it often happens that this character is not constant, and one has only to arrange a series according to it, and after to carefully examine the frenulum, and it will then be found that in most cases the sexes have been mixed.

The variation in size of individual specimens of the same species is also very remarkable, and I give measurements of fore wing of a few of the most striking cases that I have before me :—

	♂. mm.	♀. mm.
<i>Xanthocastnia evalthe</i> .....	30-39	30-48
<i>Erythrocantnia syphax</i> .....	37-52	37-53
<i>Ceretes marcel-serresi</i> . . . . .	20-36	..
<i>Sympalanudes mimon</i> .....	25-35	30-42
<i>Ypanema decussata</i> .....	26-40	31-44
<i>Acilota palatinus</i> .....	30-41	29-43
<i>Haemonides cronida</i> .....	32-44	41-52

I have arranged the collection before me after Houlbert, and have followed his classification throughout this paper; but I think that a further study of this family will lead to the sinking of many new generic names used by him.

*Cyparissias dedalus*, Cram.*Papilio dedalus*, Cram. Pap. Exot. i. p. 1, figs. A, B (1775).

This species appears to be much rarer in French Guiana than *C. guyanensis*, Houlb.

3 ♀ ♀, Lower Maroni, French Guiana.

*Cyparissias dedalus paraënsis*, subsp. n.

This form may easily be distinguished from the typical *dedalus* by the larger and more lunulate submarginal spots of the hind wing; these spots have the tendency to be produced along the nervules by yellowish scaling, and give the impression of an incomplete oval marking; the pale markings are also more yellowish than in *dedalus*.

7 ♂ ♂, 6 ♀ ♀, Para, Amazonas.

*Cyparissias dedalus conspicua*, Rothsch.

*Castnia* (*Cyparissias*) *dedalus conspicua*, Roths. Novit. Zool. xxvi. p. 2 (1919).

1 ♂, Buenavista, E. Bolivia.

*Cyparissias guyanensis*, Houlb.

*Castnia guyanensis*, Houlb. Et. des Lép. Comp. xiii. p. 50, pl. 1. fig. 1 (1917).

Considerable confusion has arisen over this species, described by Houlbert (*loc. cit.*). In his "Revision of the Castniinae" (Études Lép. Comp. xv. p. 92) he treats *dedalus*, Cram., as an insect unknown in collections. Jordan (in Novit. Zool. xxiv. p. 59, 1917) described a species under the name of *grandis*, and pointed out that the chief difference (apart from the structure of the genitalia) is in the absence of white spots above first radial nervule of fore wing and in fore wing not having a hairy underside.

Talbot, in his review of Houlbert's work (Novit. Zool. xxvi. pp. 28-35), makes no mention of any species of the *Cyparissias*-group.

Rothschild, in his Supplementary Notes (*loc. cit.* pp. 1-27), places *guyanensis*, Houlb., as a synonym of *dedalus*, Cram.

When I arranged the Castniidæ in Madame Fournier's collection I had at first followed Rothschild's view, but on going carefully through it a second time, and comparing the specimens determined as *grandis*, Jord., with the figure of *guyanensis*, Houlb., I felt almost certain that I had to deal with the same species.



Fortunately, Mr. Talbot was passing through Paris on his way to visit M. Charles Oberthür at Rennes, and I asked him to be kind enough to examine Houlbert's type; and he did so, and found, as I expected, that it is the species without the hairy underside of fore wing. I also examined the specimens in the Paris Museum that were sent to Houlbert, and found them all to be the non-hairy species.

As Dr. Jordan's description appeared in May 1917, and that of Houlbert in March of the same year, it is the latter who has priority, and *grandis*, Jordan, sinks as a synonym.

The pale spots of double row of hind wing in this species are very variable in size; in one specimen from French Guiana the outer row is almost obsolete; other specimens have the spots of the inner row smaller than those of the outer, while others have them of similar size in each row. The two specimens from Para are not to be distinguished from those from Guiana.

10 ♂♂, 4 ♀♀, Lower Maroni, French Guiana; 1 ♂, 1 ♀, Para, Amazons.

*Cyparissius boliviensis*, Houlb.

*Castnia boliviensis*, Houlb. Etud. Lép. Comp. xiii. p. 52 (1917).

Lord Rothschild states (Novit. Zool. xxvi. p. 3, 1919) that the nine males at Ting agree exactly with Preiss's figure; one of the specimens in Madame Fournier's collection differs in having the oblique white band of fore wing extended to vein 1.

2 ♂♂, Rio Inambare, S.E. Peru.

*Cyparissius preissi*, Stgr.

*Castnia preissi*, Stgr. Dec. Ent. 1899, t. xiv. p. 21.

This appears to be an exceedingly rare species. The type is from Iquitos, Upper Amazons. The two specimens in Madame Fournier's collection differ from Preiss's figure of the type ['Neue und seltene Arten des Lepidopteren-Genus *Castnia*,', Taf. i. fig. 4 (1899)], inasmuch as the oblique white band of fore wing is not continued as far as margin.

2 ♂♂, Lower Maroni, French Guiana.

*Amauta angustata*, Druce.

*Castnia angustata*, Druce, Ann. & Mag. Nat. Hist. (7) xx p. 505 (1907)

Houlbert, in his work on the Castniinae (Etud. Lép. Comp. p. 125), does not state whether there is any difference between

the markings of the male and female. The two specimens I have before me differ, inasmuch as the male has the cellular spot of fore wing very indistinct, the discal band and submarginal spots of hind wing less pronounced.

1 ♂, Canelos, Ecuador; 1 ♀, Balsapamba, Ecuador.

*Amauta cacica*, Herr.-Schäff.

*Castnia cacica*, H.-S. Ausseur. Schmett. pl. liv. fig. 143 (1851).

1 ♀, Bogota, Colombia.

*Amauta cacica procera*, Bois.

*Castnia procera*, Bois. Spec. Gén. Lépid. Hét. p. 503 (1874).

3 ♂♂, 2 ♀♀, without locality; 1 ♀, Chiriqui.

*Amauta papilionaris velutina*, Houlb.

*Castnia velutina*, Houlb. Etud. Lépid. Comp. fasc. xiii. p. 55 (1917).

7 ♂♂, 9 ♀♀, Macas, Ecuador.

*Amauta papilionaris affinis*, Roths.

*Castnia (Amauta) papilionaris affinis*, Roths. Novit. Zool. xvi. p. 3 (1919).

1 ♂, Chanchamayo, Peru; 1 ♀, La Merced, Peru.

*Corybantes pylades*, Stoll.

*Papilio pylades*, Stoll, in Cramer, Pap. Exot. vol. iv. p. 200, pl. cccxxxvii. figs. A, B (1782).

This species appears to be fairly constant, the principal variation being in the size of the black spots of submarginal orange band of hind wing.

8 ♂♂, 6 ♀♀, Lower Maroni, French Guiana; 2 ♂♂, 1 ♀, Para, Amazons.

*Corybantes mathani*, Oberth.

*Castnia mathani*, Oberth. Etud. Entom. fasc. vi. pl. iv. fig. 2 (1891).

1 ♀, Lower Maroni, French Guiana.

*Castniomera atymnius*, Dalm.

*Castnia atymnius*, Dalm. Prodr. Monogr. *Castniæ* in Act. Holm. p. 1: (1824).

2 ♀♀, Sao Paulo, Brazil.

*Castniomera atymnius humboldti*, Boisd.*Castnia humboldti*, Boisd. Spec. Gén. Lépid. Hét. p. 528 (1874).

1 ♂, Muzo, Colombia.

*Castniomera atymnius futilis*, Walk.*Castnia futilis*, Walk. Cat. Lepid. Ins. Brit. Mus. vol. vii. p. 1581 (1856).

1 ♀, Honduras; 1 ♂, Cartago, Costa Rica.

*Castniomera atymnius ecuadorensis*, Houlb.*Castnia ecuadorensis*, Houlb. Etud. Lépid. Comp. fasc. xiii p. 57 (1917).

1 ♂, Zarayaquillio, Ecuador; 1 ♂, 1 ♀, Paramba, Ecuador; 2 ♂♂, without locality.

*Castniomera drucei*, Schaus.*Castnia drucei*, Schaus, Ann. & Mag. Nat. Hist. (8) vii. p. 191 (1911).

2 ♂♂, Costa Rica; 1 ♂, Chiriqui; 1 ♂, C. America.

*Castnia licoides*, Boisd.*Castnia licoides*, Boisd. Spec. Gén. Lépid. Hét. p. 527, pl. i. (1874).

7 ♂♂, Para, Amazons; 5 ♂♂, Santarem, Amazons.

## Guiana race.

Among the series is a most remarkable aberration, which is entirely without the marginal orange spots of hind wing, thus giving it a strong resemblance to *Castniomera atymnius*. I propose the name *immaculata* for this form.

21 ♂♂, 10 ♀♀, Lower Maroni, French Guiana.

*Castnia licoides insularis*, Houlb.*Castnia licoides*, form *insularis*, Houlb. Etud. Lépid. Comp. fasc. xv. p. 235 (1918).

1 ♂, St. Ann's, Trinidad.

*Castnia licoides peruviana*, subsp. n.

I give this name to the subspecies from Peru, which has already been described and figured by Houlbert [Etud. Lépid. Comp. fasc. xv. p. 235, pl. U. fig. 77 (1918)].

This race can quite easily be distinguished by its large size and the greater extent of white on the hind wings.

11 ♂♂, Rio Tono, C. Peru; 6 ♂♂, La Merced, C. Peru.

#### Ecuador race.

This race seems to be very variable as regards the size and number of marginal orange spots of hind wing. I have not sufficient material before me to venture to give it a name.

4 ♂♂, 1 ♀, Zarayaquillo, Ecuador; 1 ♂, Paramba, Ecuador.

#### *Castnia licoides*, ab. *licoidella*, Strand.

*Castnia licus licoidella*, Strand, in Seitz, *Macrolep. Erde*, vol. vi. p. 8, pl. ii. b (1913).

I am quite of the opinion of Lord Rothschild [Novitat. Zool. xxvi. p. 9 (1919)] that *licoidella*, Strand, is nothing more than an aberration of *licoides*, Boisd., and is to be found among all the races of that species. Houlbert only knew of specimens of *licoidella* from Peru, and as he had a long series—twenty specimens—before him, it is not surprising that he took it to be a distinct species. I am, however, able to add several new localities for this form, and I think if all Lepidopterists who possess it would carefully examine the localities of their specimens that other localities would probably be added to its already known habitat.

6 ♂♂, Lower Maroni, French Guiana; 1 ♂, St. Ann's, Trinidad; 1 ♂, Villavicencia, Colombia; 2 ♂♂, Ecuador; 1 ♂, Canelos, Ecuador.

#### *Castnia albomaculata*, Houlb.

*Castnia albomaculata*, Houlb. *Etud. Lépid. Comp. fasc. xiii. p. 59, pl. iv. (1917).*

3 ♂♂, La Merced, C. Peru; 1 ♂, Rio Tono, C. Peru.

#### *Castnia albomaculata tulboti*, subsp. n.

Differs from typical form in having white band of fore wing somewhat narrower and in the subapical white spots not being so sharply defined; the white band of hind wing more continuous and less broken near costa than in the Peruvian form.

2 ♂♂, Zarayaquilla, Ecuador.

*Erythrocastnia syphax*, Fabr.*Papilio syphax*, Fabr. Syst. Entom. p. 480. no. 165 (1775).

In the long series from French Guiana there appears to be but little variation, most of them having the black patch in the red border of hind wing at anal angle well marked; but one specimen is without it, and therefore agrees with the Amazonian race. There are two specimens of a curious aberration which has the oblique white band of fore wing interrupted at veins 2 and 3; for this aberration I propose the name of *interrupta*.

26 ♂♂, 6 ♀♀, Lower Maroni, French Guiana; 1 ♂, Biazil? This locality is probably erroneous; the specimen was received from a German dealer bearing the ticket "*Castnia syphax*, var. ♀, Brasil." It is a male, and has the anal black patch in red border of hind wing well defined.

*Erythrocastnia syphax completa*, subsp. n.

This subspecies differs from the typical Guiana form in wanting the anal black patch in red border of hind wing. As already noticed, it occurs as an aberration in Guiana, but in the Amazon district it is the typical form. One of the specimens from Santarem resembles the aberration *interrupta* described above, inasmuch as it has the oblique white band of fore wing interrupted at vein 2.

2 ♂♂ (type), Santarem, Amazons; 2 ♂♂, Para, Amazons.

*Xanthocastnia evalthe*, Fabr.*Papilio evalthe*, Fabr. Syst. Entom. p. 480. no. 166 (1775).

I think that allowance should always be made for the roughness of Cramer's figures. Lord Rothschild has already pointed out [Novitat. Zool. xxvi. p. 1 (1919)] that, though the originals in the British Museum are very well drawn, that the reproductions are often very coarsely executed; I therefore adopt the name of *evalthe*, Fabr., for the form from French Guiana, and consider the name of *evaltheiformis*, Houlb., to be merely a synonym.

8 ♂♂, 13 ♀♀, Lower Maroni, French Guiana; 1 ♀, no locality.

*Xanthocastnia evalthe quadrata*, Rothsch.*Castnia* (*Xanthocastnia*) *evalthe quadrata*, Rothsch. Novitat. Zool. xxvi. p. 10 (1919).

One specimen from Ecuador wants the characteristic cellular yellow spot on underside of hind wing.

One female is remarkable in having the black of hind wing shot with steel-blue.

2 ♂♂, Zarayaquillio, Ecuador; 1 ♂, 3 ♀♀, Chanchamayo, C. Peru; 1 ♀, San Luis, C. Peru; 1 ♀, Rio Tono, C. Peru; 1 ♂, 1 ♀, La Merced, C. Peru.

*Xanthocastnia evalthe evalthonida*, Houlb.

*Castnia evalthonida*, Houlb. Etud. Lépid. Comp. fasc. xiii. pl. iv. fig. 5 (1917).

1 ♀, Colombia.

*Xanthocastnia evalthe cuyabensis*, subsp. n.

Fore wing of male not differing from that of the typical form. Hind wing with the three anterior spots of the discal band larger than in typical *evalthe*; on the underside the spot in cellule 5 is smaller than the others. In one male the outer band of the fore wing extends to just below vein 4, and in the other it nearly touches vein 3; the red spots and red anal patch are variable in this species. The principal difference between the female of this form and the type is in the slightly wider subapical band of fore wing and in the discal band being equally wide at anal angle as on costa.

1 ♀, River System, Cuyaba Corumba, Matto Grosso.

I am indebted to Mr. G. Talbot for the description of the male of this new form, the type of which is in the collection of Mr. Joicey, together with another specimen, the two being from the same locality as the female in Madame Fournier's collection.

*Graya dalmanii*, Gray.

*Castnia dalmanii*, Gray, Trans. Ent. Lond. 1887, p. 145.

One specimen has the black spots in marginal red border of hind wing well separated.

4 ♂♂, Rio de Janeiro, Brazil.

*Athis hegemon*, Koll.

*Castnia hegemon*, Koll. Ann. Wien. Mus. vol. i. p. 217, pl. xiii. fig. 2 (1839).

8 ♂♂, 3 ♀♀, Rio de Janeiro, Brazil.

*Athis fons-colombei*, Godt.

*Castnia fons-colombei*, Godt. Enc. Méth. vol. ix. p. 799. no. 13 (1824).

This species shows considerable variation in the apical

black markings of hind wing above ; some specimens have the double series, marginal and submarginal, well developed ; others have the submarginal series wanting, and, again, others lack the marginal series. At present I have not seen an example which entirely wants both series, but one specimen in Madame Fournier's collection has the submarginal spots barely indicated by reddish scales, and the marginal spots are but very slightly developed, being represented only by black scaling on the nervules.

21 ♂ ♂, 4 ♀ ♀, Rio de Janeiro, Brazil ; 1 ♂, no locality.

*Athis fabricii boisduvalii*, Walk.

*Castnia boisduvalii*, Walk. List Lepid. Ins. Brit. Mus. pt. i. p. 27 (1854).

5 ♂ ♂, 2 ♀ ♀, Brazil.

*Athis fabricii papagaya*, Westw.

*Castnia papagaya*, Westw. Trans. Linn. Soc. Lond. 1877, p. 170, pl. xxx. fig. 6.

2 ♂ ♂, 6 ♀ ♀, Brazil.

*Athis fournieri*, sp. n. (Pl. IV. fig. 1.)

♂. Upperside : fore wing dark chocolate-brown, the discal area bearing the characteristic horseshoe-shaped mark of this group, this mark being reddish orange in colour ; marginal area slightly paler and suffused with reddish-orange scales ; three subapical transparent spots, of which the upper is the smallest and the centre the largest. Hind wing reddish orange, basal third black except costal area ; discal wide pale yellow band from inner margin, shading off into the reddish-orange ground-colour just beyond vein 6 ; submarginal wide black band from inner angle to near vein 8 ; a black spot beyond at apex ; veins between this black band and margin widely bordered with black.

Underside : fore wing orange-brown, apex chocolate-brown, inner margin shining greyish ; a chocolate-brown costal patch at end of cell, lower part of this patch black ; a submarginal black bar from vein 1 to vein 4 ; transparent spots as above. Hind wing cream-colour, suffused with reddish brown on costal area ; a reddish-brown band from costa to end of cell ; a wide, marginal, reddish-brown band, of which the upper half is suffused with cream, and a series of submarginal pale creamy-red spots, diminishing in size towards anal angle.

Basal part of abdomen black, the rest pale yellow ringed with black; anal tuft orange-brown.

1 ♂, Ecuador.

This species seems to be nearest to *A. herichii*, Boisd., but may easily be distinguished by the orange hind wing, which bears a most remarkable resemblance to that of *Acilota palatinus ferruginosa*, Lathy.

*Athis orestis*, Walk.

*Castnia orestes*, Walk. List Lepid. Ins. Brit. Mus. pt. i. p. 26 (1854).

3 ♂ ♂, Rio de Janeiro, Brazil; 1 ♂, Brazil.

*Paysandisia josepha*, Oberth.

*Castnia josepha*, Oberth. Etud. Léop. Comp. 1913, vol. ix. 1, p. 63, pl. cclvii. fig. 2164 ♂, 2165 ♀.

1 ♀, Paysandu, Uruguay.

*Elina icarus*, Cram.

*Papilio icarus*, Cram. Pap. Exot. i. p. 26, pl. xviii. figs. A, B (1775).

In the long series from Guiana before me I find several specimens that have discal and submarginal white spots in apical area of hind wings above.

20 ♂ ♂, 7 ♀ ♀, Lower Maroni, French Guiana.

*Elina icarus penelope*, Schauf.

*Castnia penelope*, Schauf, Nunquam Otiosus, p. 9, pl. i. (1870).

1 ♂, Santarem, Amazons.

*Elina icarus endelechia*, Druce.

*Castnia endelechia*, Druce, P. Z. S. 1893, p. 280.

2 ♂ ♂, Sapucay, Paraguay.

*Elina eudesmia*, Gray.

*Castnia eudesmia*, Gray, Trans. Ent. Soc. Lond. 1838, p. 145.

1 ♂, Valparaiso, Chili; 1 ♀, Central Chili.

*Ceretes marcel-serres*, Godt.

*Castnia marcel-serres*, Godt. Enc. Méth. ix. p. 800 (1824).

1 ♂, 4 ♀ ♀, Rio de Janeiro, Brazil; 1 ♂, Santa Catharina, Brazil; 1 ♂, no locality.



*Ceretes thais*, Drury.

*Papilio thais*, Drury, Ill. Nat. Hist. iii. p. 20, pl. xvi. fig. 4 (1782).

I quite agree with Lord Rothschild and Mr. Talbot that *gracillima*, Houlb., is nothing but a slight aberration of *thais*, Drury, and not a local race. Madame Fournier has seven females from Rio de Janeiro, and therefore, according to Houlbert, these should be *gracillima*; but only two out of these seven can possibly be referred to this form—the others are *thais*, Drury.

2 ♂♂, 7 ♀♀, Rio de Janeiro, Brazil; 1 ♂, 1 ♀, Brazil; 1 ♂, no locality.

\* *Sympalamides phalaris mygdon*, Dalm.

*Castnia mygdon*, Dalm. Vet. Handb. Act. Holm. 1824, p. 403. no. 13, pl. i. fig. 2.

1 ♂, no locality.

*Sympalamides phalaris mimon*, Hubn.

*Sympalamides mimon*, Hubn. Samml. Exot. Schmett. vol. ii. pl. cxlii. figs. 1, 2 (1822-24).

Very variable as to colour, some specimens being much paler than others; the spots of the hind wing vary from white to buffish.

17 ♂♂, 3 ♀♀, Rio de Janeiro, Brazil; 2 ♂♂, Sao Paulo, Brazil; 3 ♂♂, 1 ♀, no locality.

*Sympalamides phalaris sora*, Druce.

*Castnia sora*, Druce, Ann. & Mag. Nat. Hist. (6) xvii. p. 217 (1896).

1 ♂, Sapucay, Paraguay.

*Ypanema hubneri*, Boisd.

*Castnia hubneri*, Boisd. in Latr. in Cuv. Règne Anim. vol. iii. p. 439, pl. xx. fig. 2 (1830).

1 ♂, Nivac, Matto Grosso; 1 ♂, Brazil; 1 ♂, 1 ♀, no locality.

*Ypanema godartii*, Mén.

*Castnia godartii*, Mén. Descr. Nouv. Esp. Lepid. Mus. Petr. pt. iii. p. 130. no. 1462, pl. xi. fig. 4 (1863).

1 ♀, Theresopolis, Brazil.

*Ypanema decussata*, Godt.*Castnia decussata*, Godt. Enc. Méth. vol. ix. p. 799 (1824).

7 ♂♂, 1 ♀♀, Rio de Janeiro, Brazil; 2 ♂, Rio Grande do Sul, Brazil; 1 ♂, Brazil; 2 ♂♂, no locality.

*Schaefferia amycus*, Cram.*Papilio amycus*, Cram. Pap. Exot. vol. iii. p. 60, pl. cccxvii. figs. D, E (1779).

1 ♂, Lower Maroni, French Guiana.

*Schaefferia amycus alboinsignita*, Strand.*Castnia amycus*, form *alboinsignita*, Strand, in Seitz. Grossschmett. Erde, vol. vi. p. 13, pl. v. d (1913).

2 ♂♂, no locality.

*Acilota inca*, Walk.*Castnia inca*, Walk. List Lepid. Ins. Brit. Mus. pt. i. p. 24. no. 22.

1 ♂, Honduras.

*Acilota inca orizabensis*, Strand.*Castnia clitarcha*, form *orizabensis*, Strand, in Seitz. Grossschmett. Erde, vol. vi. p. 11, pl. viii. e (1913).

2 ♂♂, Vera Cruz, Mexico.

*Acilota palatinus*, Cram.*Papilio palatinus*, Cram. Pap. Exot. vol. ii. p. 98, pl. clix. figs. B, C (1777).

M. Houlbert divides this genus into two sections, which he distinguishes only by the subapical transparent spots of fore wing, one section having but one of these spots and the other two. In the former section he places *A. palatinus*, but at the same time (p. 457) he states that this species occasionally has the second spot. The submarginal pale spots in black border of hind wing vary considerably in size.

48 ♂♂, 12 ♀♀, Lower Maroni, French Guiana.

*Acilota palatinus pallida*, subsp. n.

This race differs from typical *palatinus* in being paler and in the median band of hind wing being white instead of yellow.

2 ♂♂, St. Ann's, Trinidad.

\* *Aciloua palatinus ferruginea*, sub-sp. n.

Differs from typical *palatinus* and the race *palatinus* 11 having the ground-colour of fore wings above much darker, the submarginal reddish-brown spots of hind wing a triangular and touch at their bases; the ground-colour of the fore wing below is uniform dull orange, without the brown apical area of the other forms. In *palatinus* and its known races the costal black patch contains an orange patch at its lower end; in the new race the costal patch is entirely black and there are two black spots between veins 2 and 3, of which the upper is the larger. Hind wings below similar to that of *palatinus*, but more reddish in tint, the submarginal band black.

1 ♀, Cuencanayac, Peru.

*Aciloua superba orientalis*, sub-sp. n.

This race differs from the figure given by Strand in *Serica*, Grossschmett. Erde, vol. vi. p. 11, pl. v. a (1913), in having the fore wing considerably darker. Strand's figure shows a discal area pale yellow; in the new race this area is dark plumbeous grey and corresponds to the colour of the subbasal area of Strand's figure. The subapical spots are not of equal size, the lower being twice that of the upper; the yellow band of hind wing is narrower and the marginal spots smaller and well separated. Strand does not figure the underside, and his description (*loc. cit.* p. 12) is very short; I therefore give a detailed description of the new race:—

Fore wing: basal third orange-brown; a large costal black patch at cell 1 cell, subbasal black patch on vein 2; median band yellow, becoming orange towards costal, apical area dark brown, subapical pale spots as above; a submarginal black band, commencing on inner margin and extending or gradually narrowing to a point to vein 6; this band inwardly edged with narrow orange band and outwardly with orange patches.

Hind wing yellowish white, with wide, marginal, reddish-brown border; submarginal spots as above, but more yellow; black patch at anal angle; obscure reddish-brown patch on discal area extending from costa to cell.

1 ♀, Lower Maroni, French Guiana.

*Imara pallasia*, Esch.

*Castnia pallasia*, Esch. Kotzeb. Reise, vol. iii. p. 27, pl. vi. fig. 27 (1821).

This species is very variable as to white band, and also as  
Ann. & Mag. N. Hist. Ser. 9. Vol. ix. 6

to red spotting, of hind wing, and I feel sure that with a long series one would find all forms of passage from typical *pallasia* to a form almost without red, and from the wide-banded variety to the extreme form *umbratula*, which has black hind wings.

1 ♂, 1 ♀, no locality; 1 ♂, Santa Catharina: these are typical *pallasia*. 12 ♂♂, 2 ♀♀, Rio de Janeiro, Brazil: form *lativitta*, Strand. 1 ♀, Sao Paulo, Brazil: form *nigrescens*, Houlb. 2 ♂♂, 1 ♀, without locality: form *umbratula*, Strand.

*Imara satrapes*, Koll.

*Castnia satrapes*. Koll. Ann. Wien. Mus. i. p. 216, pl. xii. fig. 3 (1839).

The specimen in the collection before me agrees almost exactly with Westwood's figure [Trans. Linn. Soc. Lond. ser. ii., Zool. vol. i. tab. xxxi. fig. 4 (1875)]; the subapical spots of fore wing are wanting and the submarginal spots in the black border of hind wing are more reddish brown than in those of the figure. I cannot guarantee the exactitude of locality, as the specimen was purchased, and not received direct.

1 ♀, Rio de Janeiro, Brazil.

*Imara satrapes catharina*, Preiss.

*Castnia satrapes*, var. *catharina*, Preiss, Neue & Setz., Art. Cast. p. 7, pl. i. fig. 1, pl. ix. fig. 3 (1899).

1 ♂, Rio Grande do Sul, Brazil.

*Prometheus cochrus*, Fabr.

*Papilio cochrus*, Fabr. Mant. Ins. pt. ii. p. 25. no. 263 (1757).

The specimen from Sao Paulo differs from those from Rio in having the white markings of hind wing of more equal size, thus giving the impression of a white band rather than a white patch; the abdominal red patches are also much smaller, and in this respect resemble those of *garbei*, Foett.

4 ♂♂, Rio de Janeiro, Brazil; 1 ♂, Sao Paulo, Brazil.

*Prometheus garbei*, Foett.

*Castnia garbei*, Foett. Rev. Mus. Paul. vol. v. p. 639, pl. xvi. fig. 6 (1902).

5 ♂♂, 5 ♀♀, Rio Grande do Sul, Brazil.

*Orithia therapon*, Koll.

*Castna therapon*, Koll Ann. Wien Mus vol 1 p 218, pl III fig 3 (1839)

The principal variation of this species appears to be in the yellowish spotting of the marginal black border of hind wings. Houlbert rightly remarks [Étud. Lep. Comp. xv. p. 505 (1918)] that this character is individual and not sexual; Madame Fournier's series of males varies from a specimen with but a faint indication of a well wish spot at anal angle to an other which has a series of seven spots.

11 ♂♂, 2 ♀♀, Rio de Janeiro, Brazil

*Cynostola diva chinquensis*, Strand

*Castna diva chinquensis*, Strand, in Seitz Grossschmett. Lel. vol VI p 13 (1913)

2 ♀♀, Chiqui.

*Cyanostola diva tricolor*, Feld.

*Castna tricolor*, Feld Reise Novara, Lepid IV pl LVIII fig 3 (1841)

1 ♀, Bogota, Colombia.

*Haemonides cronis*, Cram.

*Papilio cronis*, Cram Pap Exot vol II p 125, pl CLXXXIII fig 1 (1777)

This species appears to be exceedingly rare, and, with the scanty material to work upon, it is very difficult to say whether there are several races or not. Houlb. it had apparently no specimen for examination, and was only acquainted with the various figures. I am inclined to think that Cramer's figure, without black band on hind wing below, represents an extreme aberration, and that Strand's figure in Seitz. Grossschmett. Erde, vol. VI. pl. VI. c (1913), represents the other extreme with heavy black band on hind wing below. The two females before me are intermediate between these two, and one of these has the band slightly more accentuated than the other. Therefore I think this character is of no specific value whatever, and of doubtful subspecific value, one of the females has the nervular white rays of fore wing well marked, as in Cramer's figure.

The males have the underside of hind wing entirely without dark band; the two specimens differ slightly, inasmuch as one of them somewhat resembles the female in

having the black margin of hind wing feebly dentated at the nervules, in the other this dentation is only noticeable at apex.

2 ♂ ♂, 2 ♀ ♀, Lower Maroni, French Guiana.

*Haemonides cronida*, Herr.-Schäff.

*Castnia cronida*, Herr.-Schäff. Samml. Auss. Schmett. p. 56, pl. lvii. fig. 142 (1850-69).

Variable as to number of yellowish-white spots in marginal black border of hind wing. In one specimen these are almost absent, in another seven well-marked spots are visible, all intermediate forms being represented. This remark applies only to the males; all the females before me have at least six well-defined spots.

30 ♂ ♂, 13 ♀ ♀, Lower Maroni, French Guiana.

*Herrichia acraeoides*, Gray.

*Castnia acraeoides*, G. R. Gray, in Griffith, Anim. Kingd. v. pl. liii. fig. 4 (1832).

1 ♀, Rio de Janeiro, Brazil.

*Tephrostola graminivora*, Schaus.

*Castnia graminivora*, Schaus, Journ. New York Entom. Soc. vol. iv. no. 4, p. 147 (1896).

1 ♀, Castro, Parana.

*Cabirus linus*, Cram. (Pl. IV. fig. 2.)

*Papilio linus*, Cram. Pap. Exot. vol. iii. p. 111, pl. celvii. fig. A (1779).

12 ♂ ♂, 9 ♀ ♀. Lower Maroni, French Guiana.

*Cabirus linus obidonus*, Rothsch.

*Castnia (Cabirus) linus obidonus*, Rothsch. Nov. Zool. xxvi. p. 24 (1919).

1 ♂, Obidos, Amazon.

*Cabirus linus peruviana*, Strand.

*Castnia linus peruviana*, Strand, in Seitz. Grossschmett. Erde, vol. vi. p. 14 (1913).

1 ♀, Chanchamayo, Peru.

*Cabirus linus dodona*, Druce.*Castnia dodona*, Druce, Ann. & Mag. Nat. Hist. (6) xvii. p. 213 (1906).

1 ♂, Ecuador.

*Cabirus linus micha*, Druce.*Castnia micha*, Druce, Ann. & Mag. Nat. Hist. (6) xvii. p. 217 (1906).

1 ♂, 1 ♀, Sapucay, Paraguay.

*Cabirus linus heliconoides*, H.-S.*Castnia heliconoides*, H.-S. Samal. auteur. Schmett. p. 53, pl. xxviii. fig. 15 (1855).

3 ♂ ♂, 2 ♀ ♀, Rio de Janeiro, Brazil; 1 ♀, Brazil.

*Cabirus omissus*, Rothschild. (Pl. IV. fig. 3.)*Castnia (Cabirus) linus omissus*, Rothschild. Nov. Zool. xvi. p. 24 (1919).

When Lord Rothschild described this as a subspecies of *C. linus*, Cram., he had before him but three specimens of *C. linus*—two from Dutch Guiana and one without locality,—while all his *omissus* were from French and British Guiana. Madame Fournier has, however, a series of *C. linus* from French Guiana, taken at the same time and place as the long series of *C. omissus*; therefore there can be no question of *omissus* being a local race of *linus*.

Dr. Jordan, who has been kind enough to examine the types in the Tling Museum for me, suggests that the difference between *linus* and *omissus* may be dimorphic, and his examination of the genitalia resulted in finding no difference between them except in the size of the penis-sheath, which he states may be due to contraction; two *omissus* and one *linus* were examined.

For the present I have regarded *omissus* as a species; it would be interesting if Lepidopterists who possess long series of the southern and western races of *C. linus* would carefully examine them, in order to find if the *omissus* form occurs in all localities with it; up to the present I only find *omissus* in Guiana and the Lower Amazon.

Apart from the distinguishing characters given by Rothschild, the nervules of the hind wing of *linus* are clothed with black scales—in *omissus* this is not so. Also in *linus* veins 4 and 5 of hind wing are well separated where emitted from cell, and in *omissus* they are close together.

27 ♂ ♂, 7 ♀ ♀, Lower Maroni, French Guiana; 1 ♂, Brazil?

*Cubius omissus fassli*, subsp. n.

May be separated from typical race by the much larger submarginal hyaline patch of fore wing and larger submarginal hyaline spots of hind wing.

1 ♂, Tapajos, Amazonas (type) ; 1 ♂, Obidos, Amazonas.

*Boisdunalia melanolimбата*, Strand.

*Castnia melanolimбата*, Strand, in Seitz Grossschmett Fide, vi p 15, pl viii e (1913)

This species is exceedingly variable, as might be expected in a *Castnia* mimicking a *Melinaea*. In the series before me I find males as pale as the female figured by Houlbert (Etud. Léop. Comp. fasc. xv. pl. cdlix. fig. 3841) and one female as dark as the male figured on same plate (fig. 3840), one male has submarginal row of pale yellow spots, and others have but one or two, while the majority want them entirely. The amount of black on hind wing is also very variable, some specimens having nearly all the wing black, and from these are all variations to a specimen which has but a slight suffusion of black scales.

21 ♂♂, 1 ♀, Rio Tono, C. Peru ; 6 ♂♂, 2 ♀♀, La Merced, C. Peru ; 2 ♂♂, 1 ♀, Chanchamayo, C. Peru, 2 ♂♂, Utcuyacu, C. Peru.

*Boisdunalia tarapotensis*, Piess.

*Castnia tarapotensis*, Piess. Neue & Selt, Art. *Castnia*, p 10, pl vi fig 5, pl vii fig 11 (1899)

1 ♀, Upper Amazons.

*Gazera zagraea*, Feld.

*Castnia zagraea*, Feld. Reise Novara, Lepid iv pl lxxix fig 2 (1875)

2 ♀♀, Chinqui.

*Gazera hahneli canelarina*, Strand.

*Castnia canelarina*, Strand, Lepidoptera Niepeltiana, 1914, p 24, Taf 1 fig 3

1 ♀, no locality.

*Nasca pelasgus*, Cram.

*Papilio pelasgus* Cram. Pap. Exot. iii p 16, pl ccu fig D (1779)

2 ♀♀, Lower Maroni, French Guiana



V.—New Mammals from French Indo-China and Siam.

By HERBERT C. ROBINSON and C. BODEN KLOSS.

IN this paper are described most of the new forms obtained by one of us during a visit to South Annam and Cochin China in 1918, others secured by our collector during a journey down the Mekong River in 1920, and two races of squirrels obtained at earlier dates in Siam and Cambodia.

1. *Tupaia glis cochinchinensis*, subsp. n.

Rather smaller than *T. g. concolor*, Bonhote, of South Annam, browner and less olivaceous, being much more richly coloured—the buff element in the pelage of *concolor* being everywhere replaced by deep ochraceous buff (almost ochraceous orange).

Darker and more richly coloured also than *T. g. cambodiana*, Kloss, from the coast of Cambodia, which is olivaceous on the shoulders with a buffy neck-stripe and less rusty on the rump. Mammæ 3—3=6, as in both the others.

*T. g. cochinchinensis* is at times profusely blackened on the posterior back, as also is *T. g. concolor*.

*Type*.—Adult female (skin and skull) collected at Trang-bom, 30 miles east of Saigon, Cochin China, on 1st June, 1918, by C. Boden Kloss. No. 3622, CBK.

*Specimens examined*.—Five from the type-locality compared with ten examples of *concolor* and seven of *cambodiana*.

For measurements see table on p. 89.

2. *Tupaia dissimilis annamensis*, subsp. n.

Like *T. d. dissimilis* (Ellis, in Grey) of Pulo Condore off the south-east coast of Cochin China, but the whitish ocular borders and neck-stripes more distinct; as a series less suffused with rusty above and on the tails, which are also distinctly darker beneath, *i. e.*, blacker.

Upper parts a grizzle of black and buff, darkest on the head and suffused with ochraceous tawny on the rump: feet finely grizzled black and buff.

Under parts and inner sides of limbs buff to cream-colour. Tail coarsely annulated buff and black, the latter in excess; the lower median line dull buffy. Mammæ 3—3=6.

The skull is short-snouted, of the kind figured as *chinensis* and *cuyonis* by Lyon (Proc. U.S. Nat. Mus. xlv. 1913, pl. viii. fig. 1, pl. ix. fig. 1).

*Type*.—Adult male (skin and skull) collected at Daban, South Annam, 650 ft., on 14th March, 1918, by C. Boden Kloss. No. 3204/CBK.

*Specimens examined*.—Four from the type-locality compared with twenty from Pulo Condore.

*Remarks*.—The difference between this and the typical race is very slight; but taken as a series the twenty island-animals are much more ferruginous.

It appears necessary to regard *T. dissimilis* as a distinct species, since its representative in Annam occurs side by side with *concolor*, which is undoubtedly only a race of *T. glis*.

For measurements see table on p. 89.

### 3. *Crocidura indochinensis*, sp. n.

Very much smaller and darker than *C. fuliginosa*, Blyth (type compared).

Viewed with the head pointing to the left and the light from the front: above deep neutral grey, the upper portion of the hairs warm clove-brown—the general effect being greyish clove-brown, slightly grizzled; beneath dark mouse-grey. With the head pointing to the light the under body appears frosted, *i. e.*, dark grey suffused with silvery. A few brownish hairs on the feet. Tail paler below than above, clad beneath with short scattered silvery hairs: a few longish hairs near the base.

External measurements taken in the flesh:—

Head and body 59 (?) mm.; tail 50; hind foot 12·2; ear 9.

Skull: greatest length 17·2; front of incisors to posterior extremity of skull 17·7; basal length 15·1; palatal length 6·9; maxillary tooth-row to tip of incisors 7·4; breadth of rostrum between lachrymal foramina 3; greatest breadth of palate-expansion outside molars 5·5; mastoid breadth 8·1; length of mandible including incisors 10·8.

*Type*.—Adult male (skin and skull) collected at Dalat, Langbian Plateau, South Annam, 5000 ft., on 7th April, 1918, by C. Boden Kloss. No. 3359/CBK. The only specimen obtained.

Species	Sex	H B	T	H f	E	Teste length	Skull length	Palatal length	Upper molar row (diacetyl)	Tip of maxillary to lachrymal notch	Rostral breadth at diastema	Interorbital breadth	Symphysial breadth	Remarks
<i>Tupia glis chinensis</i>	♂	15	1.2	1	3	53	28	16	22	7	15	27	30	22 BK
<i>Tupia glis chinensis</i>	♂	15	1.2	1	3	53	28	16	22	7	15	27	30	22 CLK

#### 4. *R. bifasciata smithi*, subsp. n.

A large race of *R. bifasciata* (Sparmann), differing from the typical form in having the back almost entirely buff, the tail black, and the yellow of the limbs sharply margined.

Below antimony-yellow to warm buff extending over the sides of the head and neck to the bases of the ears, over the upper part of the fore-limbs from the umb to shoulder and frequently over the upper side of the hind feet.

Eyelids, a long monstachial stripe passing through the roots of the vibrissae, nose, lips, and two spots on the chin black.

Remainder of pelage varying from black to brown, except for a brownish-buff patch between the ears and the whole of the dorsal area from nape to rump, where all the hairs have long buff tips; generally, but not always, there is a line of clear black between the buff of the upper and lower parts. The buff-tipped hairs extend over part of the thighs, but rarely to shoulders or fore-limbs.

Feet and tail generally clear black, though sometimes the tail-hairs are tipped with rusty brown, while the extremity bleaches to a pale colour.

There is a good deal of variation in the yellow of the back: in fresh pelage it is buff, but it becomes chamois-coloured, and in very abraded examples disappears altogether. The yellow of the sides of the face and neck and of the throat is sometimes a little paler than elsewhere.

*Type*.—Adult female (skin and skull) collected on the Langbian Peaks, South Annam. 6000 ft., on 22nd April, 1918, by C. Boden Kloss. No. 3501, CBK.

*Specimens examined*.—Three from the type-locality ; one from Arbre Broyé, 5400 ft., three from Dalat, 4500 ft., and two from Dran, 3000 ft., Langbian Mountains.

*Remarks*.—The general colour and pattern of this animal, except for the heavy buff mantle, are those of the Javan and Continental black-and-tan squirrels ; the yellow back allies it specially to the typical *bicolor*, while in the black tail it is like other mainland forms. It emphatically shows that the latter are only subspecies of *Ratufa bicolor*.

The largest example obtained has a skull length and breadth of 79 and 50 mm. respectively.

(Named after my companion in Annam, Dr. Malcolm Smith, C.B.K.)

For measurements see table on p. 93.

#### 5. *Callosciurus ferrugineus williamsoni*, subsp. n.

Above : head and body burnt-sienna to orange-rufous ; a few black-tipped hairs on the head and ears, but nowhere any grizzled areas. Feet like limbs. Base of fur on body and limbs blackish.

Chin and sides of neck ochraceous orange ; remaining under parts orange-rufous washed with bay to deep bay sharply margined from the colour of the sides, etc. Even in the palest-bellied examples the margination can be traced. Genital region partly orange-rufous. Tail with proximal half bay to chestnut, but the hairs at their bases and the whole of the distal part of the tail ochraceous orange.

*Type*.—Adult female (skin and skull) obtained at Khet Don Hcing, northern bank of the Mekong just below Xieng Khan on the Paklai loop, on 31st January, 1920, by H. C. Robinson and C. Boden Kloss's collector. No. 7183/S.

The type is an intermediate example : the extremes described above are a male and female, Nos. 7188 and 7191/S from Ban Na Tung, north bank of the Mekong just below Vien Chan (Vien Tian), on 8th February, 1920.

*Specimens examined*.—Seventeen from the north bank of the Mekong River between Muang Liep, lat. 18° 14' N., and Ban Manao, long. 104° E., a little south of the mouth of the Pak Sa tributary.

#### 6. *Callosciurus ferrugineus herberti*, subsp. n.

A good deal of black on the feet and tail ; chin, outer sides of head, neck, and limbs grizzled olivaceous.

Beneath ochraceous orange, slightly washed with bay on the abdomen, to bay; distinctly margined on the sides.

Above varying from burnt-sienna grizzled with black, chestnut on the rump and darkest on the median line, to rufous with the median line chestnut; a pale rufous thigh-patch. Tail ochraceous orange to chestnut much blackened; terminal portion creamy to ochraceous orange.

*Type*.—Adult male (skin and skull) obtained at Hup Bon, near Sriracha, S.E. Siam, on 25th July, 1915, by Mr. E. G. Herbert's collector, No. 2017/CBK. The type is the darker extreme, the paler specimen, No. 2018/CBK, has the same history and was collected on 27th July.

For measurements see table on p. 93.

#### 7. *Callosciurus ferrugineus pierrei*, subsp. n.

Like the form inhabiting Cambodia, but decidedly darker, especially on the median area of the back, limbs not annulated or grizzled; sides of the head and muzzle dark grizzled black and ferruginous, very black in the neighbourhood of the vibrissæ. Tail with a clear pale buffy tip. Feet and hands rather lighter than the rest of the pelage, ungrizzled.

*Type*.—Adult (skin and imperfect skull) collected by Pierre on Phu Quoc Island, off the coast of Cambodia, in February 1874 (ex Paris Museum). Brit. Mus. No. 78, 6. 17. 27.

*Measurements*.—Hind foot (dry) 47.5 mm.

Skull: palatilar length 23.2; diastema 13.0; upper molar row including pm<sup>4</sup> (alveolar) 11.0; least interorbital breadth 19.2; zygomatic breadth 34.0; median nasal length 17.3.

#### 8. *Callosciurus ferrugineus phanrangis*, subsp. n.

Above a grizzle of black and pale buff, blackest along the median line, the general effect being a buffy grey changing through pale buff and ivory to white on the feet. Top of muzzle and sides of head paler grey, ears brighter and more buffy, their bases at the back whitish grey.

Chin and sides of neck buffy greyish, remaining under parts cream-colour to warm buff. Tail like upper parts, but more coarsely annulated.

*Type*.—Adult female (skin and skull) with moderately-worn teeth, collected at Tour Cham, near Phanrang, S. Annam, on 23rd May, 1918, by C. Boden Kloss. No. 3660/CBK.

*Specimens examined*.—Eight from the type-locality, two taken in March and six in May.

*Remarks*.—This is a depauperated form of *S. f. griseimanus* (M.-Edw.), inhabiting the sterile coastal plain of Phanrang. Its range inland is limited by the forested hills, 10–20 miles to the west, where *S. f. griseimanus* occurs.

For measurements see table on p. 93.

### 9. *Tamias maclellandi laotum*, subsp. n.

Outer pale stripes interrupted on the shoulders, only the median stripe black, under parts cream-colour.

Above a fine grizzle of black and buffy, the general colour effect being brownish grey. A median dark stripe commencing behind the shoulders, bordered by greyish-buffy stripes more buffy than the head, these in turn bordered externally by ferruginous stripes speckled with black deeper than the head; below these come buff stripes, followed below by stripes the same colour as above. A buff stripe from the muzzle along the sides of the neck. Hind feet buffy, more so than the fore feet. Hairs of ears with white tips and black bases.

Below creamy, the hairs with grey bases. Tail annulated black and ochraceous, the hair tipped with pale buff.

The series varies: the most north-easterly examples are darkest and have the dark dorsal stripes most intense—in one instance the outer pair being almost black; the southernmost specimens are palish and most buffy, one especially (No. 7238/S from Ban Houei Huo Chang) practically lacking any rufous suffusion above.

*Type*.—Adult male (skin and skull) obtained at Pak Hin Bun, Laos, on the Mekong (lat. 17° 35' N.) on 2nd March, 1920, by H. C. Robinson and C. Boden Kloss's collector. No. 7235/S.

*Specimens examined*.—The type: ten specimens from between Pak Hin Bun and Ban Na Sao, 40 miles to the north-east; and four from between Pak Hin Bun and Savanaket, 60 miles down river, from the Laos bank or islands in mid-stream.

For measurements see table on p. 93.

### 10. *Tamias maclellandi moi*, subsp. n.

Like *T. m. laos*, but darker above; upper parts more suffused with ferruginous, so that, in addition to being more

Species.	Sex.	II. & B.	T.	III.	E.	Greatest length.	Condyllo-basilar length.	Palatilar length.	Dia-tema.	Upper molar row (Alveoli).	Nasal length.	Interorbital breadth.	Zygomatic breadth.	Remarks.
<i>Latupo bicolor smithi</i> .....	♀	415	569	83	31	76	65	29	162	14	242	31	49	3501/CBK. Teeth moderately worn.
<i>Calloscurus ferrugineus</i> <i>villanovae</i>	♀	215	251	48	24	58	49	..	128	113	17	198	31	7183/S. Teeth moderately worn.
" " <i>herberti</i> .	♂	211	198	17	22	543	155	228	12	11	16	205	32	2167/CBK. Teeth unworn.
" " <i>phanrangis</i>	♀	217	110	11	20	49	41	20	105	10	16	167	29	3660/CBK. Teeth moderately worn.
<i>Tamias macellandi latrum</i> .	♂	113	95	33	13	558	205	111	79	63	93	125	215	7235/CBK. Teeth worn.
" " <i>mol</i> ..	♂	123	112	31	13	356	293	142	79	69	9	125	21	5534/CBK. Teeth worn

richly-coloured generally, the yellow stripes are ochraceous instead of buff, while the rump and the outer pair of dorsal stripes are a brighter brown.

*Type*.—Adult male (skin and skull) collected on Langbian Peaks, South Annam, 5500–6500 ft., on 25th April, 1918, by C. Boden Kloss. No 3524/CBK.

*Specimens examined*.—Eight from the type locality; two from Aibie Broye, 5100 ft.; seven from Dalat, 4500 ft., and two from Dian, 3000 ft., Langbian Mountains.

For measurements see table on p. 93.

### 11. *Rattus edwardsi milleti*, subsp. n.

Above dark brown (between bone-brown and clove-brown), darkest down the median line, paler and grayer on the limbs (dark hair-brown), and also on the sides, which are grizzled with dull buff; sides of neck rather brighter, tinged with buffy brown.

Entire lower surface and inner sides of limbs sharply margined white except for a broad hair-brown band across the ankles of the hind feet and the hair near the base of the tail.

Tail dark throughout above, paler below, but least so proximally. Feet dark, the margins and digits pale. Mammaræ 2—2=8. Pelage of the back composed of soft hairs and slender flattened spines.

Skull like that of the Malayan form *R. e. ciliatus* (Bonhote), but with interparietal longer and less straight anteriorly and bullæ larger.

*Type*.—Adult female (skin and skull) collected at Dalat, Langbian Plateau, S. Annam, 5000 ft., on 11th April, 1918. No 3393/CBK.

*Remarks*.—At a casual glance the colour and pelage of this animal suggest relationship with the *bowersi* group of rats with ivory-coloured incisors. It has, however, nothing to do with them, but is a remarkably distinct race of *R. edwardsi*, other forms of which are *ciliatus*, mentioned above, and *setiger*, Robinson & Kloss, of Sumatra.

(Named in honour of Monsieur F. Millet, who gave me the only specimen obtained. I am greatly indebted to Monsieur Millet for assistance and hospitality during my visit to the Langbian Plateau—C. B. K.)

For measurements see table on p. 98.



12. *Rattus sabanus revertens*, subsp. n.

Colour as in *R. sabanus vociferans* (Miller) of Peninsular Siam, but hind foot with a narrower dark median stripe. Below ivory-yellow (one ex. juv., white).

Skull with nasals longer and more truncate posteriorly, ending level with the premaxillary sutures, not pointed and falling short of them, with the frontals penetrating between the premaxillaries; fronto-parietal suture much more curved.

*Type*.—Male, vix ad. (skin and skull), collected at Daban, Phanrang Province, South Annam, 650 ft., on 15th March, 1918, by C. Boden Kloss. No. 3219 CBK.

*Specimens examined*.—Four from the type-locality.

*Remarks*.—This form has a closer resemblance to *R. s. vociferans* than to the geographically-intermediate and more adjacent race *R. v. herbert*, Kloss, of East Siam.

For measurements see table on p. 98.

13. *Rattus moi*, sp. n.

Pelage very soft, close, and velvety, owing to the total absence of spines and piles; on this account not blackened as in *Rattus surifer koratensis*, Kloss, which occurs in the same region; also more richly coloured above.

Upper parts ochraceous orange, brightest on the middle-back, lightest on sides and fore limbs; head tinged with greyish wood-brown; median line and mid-back, where many of the hairs have dark tips, slightly specked with blackish.

Under parts of body and limbs white, sharply margined, and narrowly continuous to the feet; muzzle brown, lips and post-vibrissal area white. Tail bicoloured with a white tip, scutes exceedingly small, 19–20 rings to the centimetre. Extreme base of tail below clad with hair like that above. Skull of the same general type as that of *R. s. koratensis*, but separable by narrower infraorbital foramina, owing to the more vertical position of the plates, larger interparietal, much larger palatal foramina, and less truncate interpterygoid space; rostrum markedly shallower, but the incisors more prominent laterally.

*Type*.—Adult female (skin and skull) collected at Arbrey Broyé, Langbian Mountains, South Annam, 5400 ft., on 13th May, 1918, by C. Boden Kloss. No. 3588/CBK.

*Specimens examined*.—Two from the type-locality.

For measurements see table on p. 98.

14. *Rattus bukit champa*, subsp. n.

Much darker than *R. b. bukit* (Bonhote) of the Malay Peninsula; bullae much larger. Nearest in colour to the dark form from the lowlands of Java, *R. b. temmincki*, Kloss, but posterior termination of nasals broader, palatal foramina and bullae still larger.

Not so bright as *R. b. marinus*, Kloss, from the islands Koh Chang and Koh Kut, S.E. Siam, the rostrum shorter, the interpterygoid space narrower, and the bullae larger.

*Type*.—Aged female (skin and skull) collected on the Langbian Peaks, South Annam, 6000–7000 ft., on 20th April, 1920, by C. Boden Kloss. No. 3474/CBK.

*Specimens examined*.—Thirty-four from the type-locality; four from Arbrey Broyé, 5400 ft.; thirty-five from Dalat, 4500 ft.; two from Dran, 3000 ft., Langbian Mountains; and three from Daban, Phanrang Province, South Annam, 650 ft.

15. *Rattus blythi mekongis*, subsp. n.

Externally like *R. blythi* from North Tenasserim and Western Siam, but the skull with the nasals broader posteriorly, the interparietal longer and the interpterygoid space broader.

*Type*.—Adult male (skin and skull) obtained at Bak Mat on the Melong River, Laos (lat. 18° 53' N.), on 20th January, 1920, by H. C. Robinson and C. Boden Kloss's collector. No. 7172 S.

*Specimens examined*.—The type and another specimen from Muang Nuep, 25 miles down river; compared with seven examples of *R. blythi* from near Raheng, W. Siam.

*Remarks*.—We are not in a position to say whether *Rattus blythi* is a distinct species or only a form of an older-named species; but to show the intimate relationship of the Mekong animal with that from Schwegyin we have referred it to *blythi*.

For measurements see table on p. 98.

16. *Rattus cremoriventer langbianis*, subsp. n.

Most nearly resembling *R. c. cretaceiventer*, Robinson & Kloss, of Java; but a little duller in colour and the tail more finely ringed.

\* *Rattus blythi*, Kloss (*Mus cinnamomeus*, Blyth, nom. preocc.), Rec. Ind. Mus. xiii, 1917, p. 8; id. Journ. Nat. Hist. Soc. Siam, iv, 1921, p. 65.

Skull with interpterygoid space and basioccipital a little narrower; bullæ a little more dilated; foramen magnum nearly circular in outline, not flattened and oval.

*Type*.—Adult male (skin and skull) collected on Langbian Peaks, South Annam, 5500–6500 ft., on 28th April, 1918, by C. Boden Kloss. No. 3556/CBK.

*Specimens examined*.—Two from the type-locality and three from Dalat, Langbian Mountains, 4500 ft.

### 17. *Rattus molliculus*, sp. n.

Superficially resembling immature examples of the Annam country rat, *Rattus rattus sladeni* (Anderson), but the upper parts totally devoid of spines, the feet paler, and the under parts varying from pure white to buffy white with visible grey bases to the hairs. Mammæ 2—3=10 instead of 3—3=12 as in *sladeni*.

Skull remarkably like that of *R. r. sladeni*, but much less robust, especially more slender throughout. Infraorbital foramina larger, most noticeable when viewed from above; bullæ larger and more dilated and more nearly paralleled.

Above "sayal" brown to buffy brown (*Ridgway*), streaked with blackish, paler and greyer on sides of head and body and on the limbs. Hind feet white, fore feet only a little paler than the forearms.

Under parts varying from fur with grey bases and creamy tips in the older animals to pure white in the younger.

Tail dark throughout, but generally clad beneath proximally with short silvery hairs: about 13 rings to the centimetre at mid-length.

*Type*.—Female vix ad. (skin and skull), collected at Daban, Phanrang Province, South Annam, 650 ft., on 23rd March, 1918, by C. Boden Kloss. No. 3267/CBK.

*Specimens examined*.—Seven from the type-locality, one from Ban Na Kham, 1150 ft., North Siam (27 miles east of Outeradit), and one from Ban Tuoi, Laos, just below Pon Pissai on the Mekong.

*Remarks*.—Though superficially so like immature *R. rattus*, this animal has nothing to do with that species and, knowing no other to which to refer it, we must regard it as quite distinct.

For measurements see table on p. 98.

Species.	Sex.	H. & B.	T.	Ill.f.	E.	Greatest length.	Condyl- basilar length.	Diastema.	Up per molar row (alveoli).	Length of palatal foramina.	Length of nasals.	Combined nasal breadth.	Zygomatic breadth.	Remarks.
<i>Rattus edwardsi</i> miller. ....	♂	256	308	63	31	59	51	15.7	10.2	9.0	22.6	6.5	26.1	3398/CBK. Teeth moderately worn.
" <i>salvatus revertens</i> .....	♂	233	238*	45	32	54.7	45	13.3	9.9	7.3	21.3	6.3	23.5	3219/CBK. Teeth slightly worn.
" <i>moi</i> .....	♀	160	160	40	28	43.6	36.3	12.1	6.8	6.9	15.8	4.2	18.5	3588/CBK. Teeth moderately worn.
" <i>bukit champa</i> .....	♀	154	188	28	21	39.5	33.4	10.2	6.5	7.0	15.0	4.4	18.8	3474/CBK. Teeth much worn.
" <i>bigali mekongis</i> .....	♂	136	208	29	22	39.4	33.0	10.3	6.1	7.0	15.5	4.0	17.9	7172/S. Teeth well worn.
" <i>cremorerienter tanghinis</i> .	♂	125	175	26	20	34.5	28.2	8.9	5.8	5.8	11.5	3.9	16.3	3556/CBK. Teeth slightly worn.
" <i>molliculus</i> .....	♀	153	170	32	22	38.1	32.2	9.5	7.0	7.0	13.0	4.0	17.5	3267/CBK. Teeth not worn.
<i>Taotatus thai annamensis</i> ....	♂	78	66	16	15	22.3	20.0	6.1	3.9	5.0	8.1	2.4	11.0	3391/CBK. Teeth not worn.

Imperfect.

18. *Tautatus thai annamensis*, subsp. n.

Like *T. t. thai*, Kloss\*, of Western Siam, but smaller and darker.

Pelage spineless; above a grizzle of black and buff or ochraceous buff, much duller and more blackened than in *T. t. thai*; limbs and sides of head greyish; below deep neutral grey, the hairs with white tips, the effect being silvery. Feet white. Tail dark above, pale beneath.

*Type*.—Adult male (skin and skull), collected at Dalat, Langbian Plateau, South Annam, 4500 ft., on 11th April, 1918, by C. Boden Kloss. No. 3391/CBK.

*Specimens examined*.—Three from the type-locality.

For measurements see table on p. 98.

VI.—On some new or little-known South African Grasshoppers. By B. P. UVAROV, F.E.S., Assistant Entomologist, Imperial Bureau of Entomology.

THE present paper includes descriptions of a number of new or insufficiently known short-horned grasshoppers from the collection sent to the Imperial Bureau of Entomology by the Division of Entomology, Pretoria, and by Prof. J. C. Faure, of the Transvaal University College †, as well as of one new genus found amongst a small, but very interesting, lot sent by Dr. Ch. K. Brain, of the Agricultural College, Stellenbosch.

All the types are preserved in the British Museum, while paratypes of species represented by more than a couple of specimens have been returned to the Division of Entomology, Pretoria, and to the Transvaal University.

## Subfamily CATANTOPINÆ.

## ✓      PRETORIANA, gen. nov. (Fig. 1.)

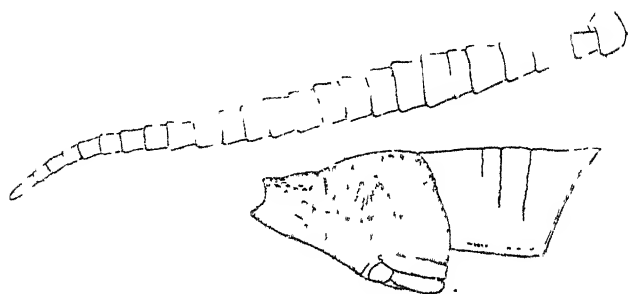
♀. Rather closely related to the genera *Ischnacrida*, Stål, and *Rhamphacrida*, Karsch. Antennæ feebly ensiform, distinctly but not strongly flattened; each of the joints of the

\* Journ. Nat. Hist. Soc. Siam, ii. 1917, p. 272; iii. 1918, pp. 63, 71.

† See my previous paper on the same collection in *Ann. & Mag. Nat. Hist.* (9) viii. pp. 369-392, October 1921.

basal half widened towards apex and its apex distinctly broader than the base of the following joint, so that the antennæ seem to be obtusely bi-serrate. Head shorter, but thicker, than the pronotum. Face very strongly reclinate, very coarsely punctured throughout; frontal ridge scarcely impressed, gradually divergent downwards, not reaching the clypeus; median ocellus very small. Fastigium of the front widely separated from the fastigium of vertex by an arched emargination. Lateral ocelli placed close to the eyes, very small. Fastigium of the vertex a little longer than its basal width, rotundato-triangular; its surface lies on a distinctly lower level than the vertex between the eyes, but still there is no transverse sulcus separating the fastigium from the rest of the vertex; the middle area of the fastigium up to the apex is smooth and flat, while the sides of its upper surface are very coarsely and densely punctured,

Fig. 1.

*Pretoriana klerki*, gen. et sp. n.

forming thick convex lateral margins. Vertex between the eyes convex, with a well-developed median carinula and two irregular low lateral carinulae; all these carinulae extend into the occiput, but do not reach the pronotum. Eyes strongly oblique, elongato-oval, with the apex pointed, one and a half times as long as broad and more than twice as long as the infraocular space. Pronotum compressed laterally; its disc distinctly convex in the prozona and more flattened in the metazona, cut by three straight transverse sulci; prozona one and a half times as long as the metazona; the fore part of the prozona subequal to the metazona; the middle part of prozona equal to one-third of its fore part; the hind part of prozona almost twice as long as its middle

part; median keel well developed, cut by all three sulci; no lateral keels; the fore margin rounded; hind margin with a broad, but not deep, obtusangular emargination in its middle. Lateral lobes of the pronotum much longer than high, strongly narrowed downwards; their fore margin oblique, feebly sinuate, forming a right angle with the straight lower margin; the hind margin more oblique than the fore margin, slightly concave in its lower part; the hind angle a little more than  $90^{\circ}$ . The whole surface of the pronotum, except a callous stripe along the lower margin of the lateral lobes, is very coarsely punctured. Prosternal spine very strongly laterally compressed, short, bent backwards, with the apex, as seen in profile, angulate. Sternum strongly laterally compressed; sternal plate nearly three times as long as broad, coarsely punctured throughout. Mesosternal lobes elongato-rhomboidal; their length nearly equal to their joint width; their inner margins touching each other along the straight median line; the fore margins forming a very obtuse rounded angle, the hind margins forming a slightly less obtuse angle. Metasternal lobes a little shorter than their joint width at the fore margin, distinctly narrowed posteriorly, touching each other along the median line. Elytra reaching to the middle of the abdomen and almost reaching the hind knees, narrowed towards the lanceolate apex. Wings distinctly shorter than the elytra, two and a half times as long as they are broad. The legs as in the genus *Ischnacrida*.

Genotype: *Pretoriana klerki*, sp. n.

This curious genus is closely related to the genera *Ischnacrida* and *Rhamphacrida*, but is very easily recognized by the quite peculiar shape of the head, as well as of the antennæ.

### 1. *Pretoriana klerki*, sp. n.

♀. Antennæ reaching to the middle of the metazona, brown. General coloration buff. Face brown. Sides of the fastigium of vertex brown, its middle part paler, with a blackish longitudinal fascia fading gradually towards the occiput, where it becomes greyish white, bordered with buff lateral fasciæ; the rest of the occiput greyish white; cheeks somewhat brownish, with a pale longitudinal fascia along the lower margin, which extends also across the lower margins of the pronotal lobes and into the pleuræ, gradually fading backwards. Disc of the pronotum buff, with a not sharply-defined reddish-brown fascia along the median keel, which is

of a lighter shade than the fascia; lateral lobes reddish brown, darker along the upper margin. Elytra pale buff basally and hyaline apically, with the principal veins reddish brown. Wings hyaline, with the principal veins somewhat reddened basally and pale buff elsewhere. Hind femora on the outside brownish buff, with the lower part of the externo-median area yellowish (corresponding to the lateral fascia on the head, pronotum, and pleuræ); the inside with a deep black fascia along the basal two-thirds of the lower margin, which emits several brown transverse fasciæ. Hind tibiæ of the general colour, beneath with the base and apex black; the spines with the tips brown.

	♀ (type).
	mm.
Length of body . . . . .	57
„ head . . . . .	7
„ pronotum . . . . .	8
„ elytra . . . . .	25
„ hind femora . . . . .	20

The unique type-specimen of this interesting insect was taken by Mr. F. de Klerk at Pretoria in April 1921, and I have much pleasure in dedicating it to the collector.

### Subfamily *LOCUSTINÆ*.

#### 2. *Edaleus gracilis*, Sauss.

1884. *Edaleus* [*Edaleus*] *nigrofasciatus* var. *gracilis*, Saussure, Prod. Oedipod. p. 116. no. 8.

*Edaleus nigrofasciatus*, auctorum (nec De Geer), ex partim.

This is one of the most common species of *Edaleus* in South Africa, and it is quite distinct from the Palæarctic *O. nigrofasciatus*, owing to the more slender habitus, smaller head, and, especially, the shape of the pronotum, which in *O. nigrofasciatus* is rectangular behind, while in *O. gracilis* it is obtusely rounded; thus form of the hind pronotal margin is intermediate between that in *O. nigrofasciatus* and *O. senegalensis*, in which the pronotum is widely rounded behind. Some more slender specimens of *O. nigrofasciatus* are very much like *O. gracilis*, but always easily separated by the shape of pronotum, and I believe that I am quite correct in restricting the name *gracilis*, applied by Saussure to both Palæarctic and South African slender specimens, to the latter only, and I am sure that *O. gracilis* is a quite good species, though very closely related to *O. nigrofasciatus*.



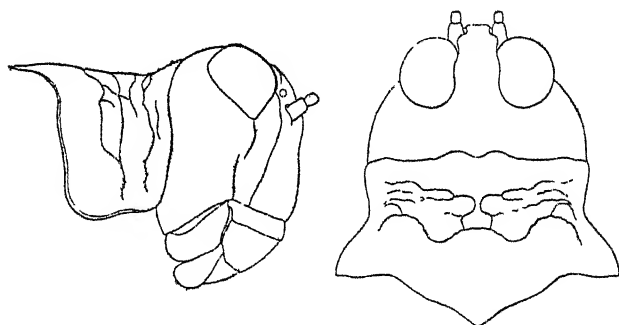
All records of the latter species from South Africa must be referred to *O. gracilis*, which is very widely distributed in that country and known to me from many localities.

*BRAINIA*, gen. nov.

Slightly reminding in its general appearance of a *Sphingonotus*, but differing from it strongly in many important characters.

Antennæ short, filiform. Face slightly reclinate, convex. Frontal ridge in profile regularly convex in its upper part, practically straight in the rest, very little projecting, almost flat, but with the margins distinctly incrassate. Fastigium of the vertex strongly sloping, in profile regularly rounded, gradually running into the frontal ridge, without any marginal carinæ; its surface perfectly flat, without a median carina; the distance between the eyes twice as broad as the frontal ridge in its broadest portion, which is just above

Fig. 2.



*Brainia hirsuta*, gen. et sp. n.

the ocellus. Occiput regularly convex. Pronotum relatively broad and short, with a feeble constriction before the middle; its disc slightly convex in the prozona and practically flat in the metazona; the transverse sulci distinct, but not deep, complicately curved (see fig. 2); the fore margin of the pronotum envelops the occiput like a collar, obtusangulately excised in the middle, with two round lobes sideways from the emargination; the hind margin obtusangular, with the apical angle not at all rounded and the sides straight; no trace of median or lateral keels; lateral lobes of the

pronotum half as high again as long, impressed in the middle, with the transverse sulci very distinct; their fore angle obtuse, the hind angle straight and rounded, the lower margin slightly ascending in its fore half, very obtusely sinuate behind its middle, the hind margin practically vertical. Prosternum with its fore margin incrassate. Mesosternal lobes (in the female) distinctly transverse, with the inner angles practically straight but widely rounded; mesosternal interspace distinctly broader than one of the lobes and about twice as broad as it is long. Meta-sternal interspace decidedly longer than its width in front, narrowed posteriorly, but the lobes still broadly separated from each other. Elytra scarcely extending beyond the hind knees, gradually narrowed from the middle towards the apex, which is oval; the neuration very remote (fig. 3), the

Fig. 3.

*Brainia hirsuta*, gen. et sp. n.

extreme base of the elytra only being coriaceous. Wings a little shorter than the elytra, hyaline. Hind femora moderately incrassate, gradually narrowed towards the apex. Hind tibiae somewhat widened apically, without outer sub-apical spines; both inner spurs about twice as long as the outer ones, thick, regularly bent. Subgenital plate (of the female) twice as long as broad, with the apex bisinuate. Lower valves of the ovipositor small, with the apical portions small and narrow; the upper valves larger and thicker, with thick blunt apices.

Genotype: *Brainia hirsuta*, sp. n.

### 3. *Brainia hirsuta*, sp. n. (Figs. 2 & 3.)

♀. The sides of the head (less so the face), of the pronotum, mesonotum, and metanotum, as well as all legs, especially the femora, covered with fairly dense whitish hairs. General coloration whitish ochraceous. Antennae with indistinct dark rings. Head lilac-white with scattered reddish punctures, especially on the cheeks. Pronotum of the same

colour as the head, turning reddish ochraceous behind; the hind margin of the disc reddish castaneous. Elytra very pale ochraceous, hyaline, with an oblique transverse reddish-ochraceous fascia in the middle and the second one of the same colour in the apical quarter; neither of these fasciæ extends over the radial veins or reaches the hind margin. Wings perfectly hyaline, with the veins in the fore part very pale ochraceous. Front and middle legs with regular castaneous rings. Hind femora with two distinct reddish-castaneous fasciæ on the upper side, and with a row of castaneous points along the lower carina of the externo-median area, which is almost white; the knees reddish ochraceous. Hind tibiæ bluish, armed with 8-9 pale black-tipped spines on each side. The underside of the body dirty yellowish.

Length of the body 17 mm.; of the pronotum 3.5; of the elytra 13; of the hind femur 10.

The unique type of this interesting insect was taken by Dr. Ch. K. Brain at Kenhardt, Cape Colony, 14.iii.1921.

The genus is strikingly different from any other known.

#### 4. *Scintharista magnifica*, sp. n.

♀. A little smaller and distinctly more slender than *S. notabilis*, Walk.; much like *S. forbesi*, Burr. Antennæ thin, extending a little beyond the hind margin of the pronotum. Face vertical; frontal ridge shallowly impressed below the ocellus, with the margins very feebly raised, slightly approximate at the fastigium, gradually diverging between the antennæ, slightly but rather suddenly convergent just before the ocellus, parallel below the latter down to the middle of the distance between the ocellus and clypeus, where they become distinctly divergent and lowered, disappearing without reaching the clypeus. Temporal foveolæ small, triangular, not well-defined. Fastigium of the vertex sloping, slightly narrowed anteriorly and posteriorly, feebly impressed, distinctly longer than broad, with a faint indication of a median carinula between the eyes; the distance between the eyes exceeds only a little the width of the frontal ridge between the antennæ. Eyes very feebly oblique, rather small, their height subequal to two-thirds of the subocular space. Occiput slightly uneven. Pronotum distinctly compressed laterally, but scarcely constricted in the prozona; its disc decidedly tectiform, with the median keel sharp, in profile slightly arched, deeply intersected by the transverse sulcus, which is placed distinctly before the

middle; surface of the prozona cut by the rather deeply impressed sulci and rugulose between them; the fore margin obtusangularly produced; the hind angle a little less than  $90^\circ$ , scarcely rounded at the apex; lateral lobes nearly twice as high as they are long, with deep transverse sulci, shallowly impressed between them, punctured in the metazona; their lower margin widely rounded behind the middle, with the fore portion obliquely ascending and forming an obtuse, not rounded, angle with the fore margin; hind angle widely rounded; hind margin straight, vertical. Mesosternal lobes transverse, with the interspace at its fore margin narrower than one of the lobes, but strongly widened posteriorly. Metasternal interspace subequal in its width to the mesosternal; about twice as broad as long. Elytra reaching well beyond the middle of hind tibiae; the whole basal half entirely coriaceous; the basal part of the apical portion is also densely reticulated, subcoriaceous; the branches of the radial vein more strongly curved than in *S. notabilis*. Wings more than one and a half times as long as their maximal width. Hind femora comparatively short.

General coloration greyish ochraceous with indefinite brown marmoration and punctation. Face somewhat whitish. Elytra without definite spots or fasciae; their basal half from beneath is deep shining chocolate-brown, with the radial and axillar veins ochraceous. Wings with the disc dark rose; a black fascia starts at the middle of the fore margin and perpendicularly to the latter, right across the wing to the hind margin, which it reaches a little behind its middle; there the fascia turns along the hind margin, gradually narrowing and fading away, and does not reach the inner margin; the width of the fascia is variable, because its margins are very irregular; the apical part of the wing is entirely hyaline, with dark veins. Pectus and abdomen from beneath bluish. Hind femora indistinctly marmorated with brown on the upper side; the externo-median area somewhat whitish, with brownish oblique sulci and a row of oblong brown spots along the lower carina; the inside is bluish black with a pale preapical ring; the lower inner sulcus blackish blue; the inner knee-lobes black; the knee from above bluish brown. Hind tibiae greyish blue, with an indefinite pale ring near the base. Hind tarsi pale.

	♀ (type).	♂ (paratype).
	mm.	mm.
Length of body . . . . .	35	27
„ pronotum . . . . .	8	5.5
„ elytra . . . . .	38	28.5
„ hind femora . . . .	19	13

Described from the female type and a male paratype from Laingsburg, Cape Province, 3. x. 1917; one male from Spitzkop, Barkley West, Cape Province, 15. xii. 1917; one male from Beaufort West, 25. iv. 1917; and one female from Deelfontein (*Col. Sloggett*).

This species is closely related to *S. forbesi*, Burr, from Sokotra, but easily distinguished from it by the reticulation of the elytra, apart from the coloration of the wings.

#### 5. *Acrotylus nigripennis*, sp. n.

♂. Small, but not slender. Antennæ nearly twice as long as the head and pronotum, somewhat flattened, distinctly thickened towards the apex. Head distinctly prominent above the pronotum, slightly reclineate. Frontal ridge sulcate throughout, except near the clypeus; its sulcus separated from the fastigial impression by a feeble keel; its margins gradually divergent from the fastigium towards the median ocellus, slightly approximated and parallel below the ocellus and divergent, but gradually disappearing towards the clypeus; the ridge at the ocellus is twice as broad as at the fastigium and distinctly narrower than the width of the vertex between the eyes. Temporal foveolæ flat, triangular, longer than wide. Fastigium of the vertex strongly sloping, distinctly depressed, about twice as long as broad; its lateral carinæ sinuate; the apex trapezoidal, truncate. Eyes slightly prominent above the vertex, oval, slightly higher than long, and their height subequal to the height of the subocular space. Pronotum not longer than its width at the shoulders, strongly constricted in the prozona, distinctly selliform, with two broad and shallow postocular impressions; the disc in the prozona convex, with a scarcely indicated first transverse sulcus and almost imperceptible median keel; the typical transverse sulcus placed in the middle, not very distinct; metazonal disc very feebly convex, with the median keel low; hind margin widely rounded; lateral lobes much higher than long, rather strongly impressed between the sulci; their fore margin bisinuate; the lower margin widely rounded in the hind half; the fore angle very obtuse, rounded; the hind angle very widely rounded. Mesosternal lobes strongly transverse; their inner margins oblique, divergent posteriorly; the hind margins not parallel to the fore margins; the inner angles very obtuse; mesosternal interspace strongly transverse, as wide as one of the lobes, distinctly widened posteriorly. Metasternal lobes separated by an interspace about as long

as it is broad. Elytra moderately long, less than five times as long as broad; the basal two-thirds coriaceous; the apical third, beyond the apex of the discoidal area, entirely hyaline, with very sparse reticulation, without false veins and with the cells elongate; intercalate vein in the discoidal area almost straight, parallel to the radial vein; the intercalate areas with an irregular, but dense and somewhat obliterated reticulation; the hind intercalate area slightly widened towards the apex, and near the apex about twice as broad as the front intercalate area; the interulnar area a little broader than the hind intercalate area, with the cells in two irregular rows and a partly obliterated reticulation; ulnar furcus about as broad as the hind intercalate area, with two irregular rows of rather large cells. Wings less than twice as long as broad, with the outer margin widely rounded and the apex very broad.

General coloration brownish grey. The lower part of the face whitish. An irregular blackish fascia runs across the front, just below the fastigium of the vertex, and is connected with the broad shining black postocular fascia by a narrow stripe of black colour embracing the lower half of the eye-orbit; cheeks marmorated with white, pale and grey; eyes from above with two indefinite grey transverse fasciæ; occiput with a triangular blackish spot near the pronotum, and indistinctly marmorated with grey elsewhere. Pronotum with two broad, dark brown lateral fasciæ on the prozona, which are better defined on the inside than on the outside; a pair of small pale callous spots on the prozona, and a pair of much larger callous spots at the fore outer angles of the metazona; disc of the metazona of a somewhat darker shade than that of the prozona; lateral lobes whitish in the lower parts, with a pale callous spot below the middle; margins with indistinct brown spots. Elytra of the general colour in the basal two-thirds, where they are coriaceous, with three rows of irregular brownish spots in the scapular, discoidal, and anal areas; the apical third hyaline, with two rather large infumate spots at the base, along the radial vein, with veins and veinlets partly brownish. Wings uniformly and very strongly infumate throughout, slightly yellowish at the very base, with the principal veins black. Hind femora with two indistinct brownish fasciæ on the upper side and brown knees. Hind tibiæ grey with brown base.

♀ (paratype). Differs from the male type in the following characters:—Antennæ extending a little beyond the pronotum. Frontal ridge sulcate throughout, strongly widened

from the fastigium towards the median ocellus, suddenly constricted below the latter, then gradually widened towards the clypeus; its margins almost reaching the clypeus. Mesosternal interspace distinctly broader than one of the lobes. Metasternal interspace about half as broad as the mesosternal, and twice as broad as long. Elytra extending only a little beyond the hind knees. Wings more narrow than in the male. Coloration much the same as in the male, but with better-pronounced markings. Elytra with two rather broad fasciæ in the marginal area, and with two rows of spots in the discoidal and in the anal areas. Wings less strongly infumate than in the male, with the base, apex, outer margin, and very narrow rays along the principal veins somewhat hyaline. Hind femora with three distinct fasciæ on the upper side. Hind tibiæ dotted with brown and with a blackish line along the lower margin.

	♂ (type).	♀ (paratype)
	mm.	mm.
Length of body . . . . .	13.5	18
"    pronotum . . . . .	2.5	3
"    elytra . . . . .	13	15.5
"    hind femora . . . . .	9	10.5

The male type was taken between Dealesville and Bloemfontein, Orange Free State, 19. v. 1917, and the female paratype at Bloemfontein, 13. ii. 1918; these are the only two specimens known.

The species is easily recognisable by the peculiar coloration of the wings, apart from the good morphological characters presented by the head, pronotum, and the venation of elytra.

### Subfamily *PIRGONORPHINÆ*.

#### *PHYMELLA*, gen. nov.

Somewhat recalling *Chrotogonus* in its habitus, but not so strongly depressed, and with the head, and especially the pronotum, far more strongly tuberculate.

Antennæ placed below the ocelli and a little above the middle of the eyes; in the female distinctly, in the male scarcely shorter than the head and pronotum, thick, scarcely depressed, the joints a little longer than broad. Face strongly reclinate; frontal ridge in profile obtusangulately broken just below the middle ocellus, narrowly sulcate throughout, but not reaching the clypeus, between the antennæ compressed but only feebly prominent. Lateral

ocelli placed on the margins of the fastigium, quite close to the eyes. Eyes distinctly prominent sideways, a little higher than long. Fastigium of the vertex slightly ascendent, a little shorter than an eye, rotundato-truncate at the apex, with a narrow longitudinal sulcus, and separated from the rest of the vertex by an arched transverse sulcus; this hind part of the vertex begins distinctly before the eyes, being strongly convex and armed with large, laterally compressed tubercles. Pronotum not rounded, armed with a median row of tubercles and with three pairs of large, laterally compressed obtuse teeth, besides numerous smaller tubercles; lateral lobes longer than high; their hind lower portion distinctly expanded sideways, with the hind angle obliquely truncate and armed with a conical tubercle. Prosternum with its fore margin incrassate and feebly raised. Sternum broad, with a complete transverse sulcus at the fore margin; mesosternal lobes in both sexes a little longer than broad, distinctly widened posteriorly, with the inner and hind margins straight and the inner angles subacute, more so in the male; mesosternal interspace distinctly narrowed posteriorly, in the male as long as its width in front, in the female much broader than long. Metasternal foveolæ small; metasternal interspace in the male twice, in the female about five times, as broad as long. Mesopleuræ and metapleuræ strongly rugulose, with several tubercles flattened dorso-ventrally. Elytra about as long as the pronotum, elliptical, covering each other on the inner margin. Wings a little shorter than the elytra, coloured. Fore and middle femora in the male incrassate. Hind femora rather narrow, but thick; externo-median area with the oblique ridges strongly raised, irregular, callous; the lower outer area distinctly dilated; the knee-lobes short, triangular, rounded at the apex. Hind tibiæ with obtuse keels, thickened apically; eight outer and ten inner spines; no outer apical spine. Supra-anal plate of the male lanceolate, with the apex rounded; cerci short, triangular, feebly laterally compressed; subgenital plate short, obtuse. Valvæ of the female ovipositor sinuate; the surface of their basal portions covered with tubercles; the outer margins of the upper valvæ obtusely denticulate basally; the lower valvæ with an obtuse tooth.

Genotype: *Phymella capensis*, sp. n.

This genus is not easy to place in any of the sections of the Pyrgomorphae, established by Dr. I. Bolívar\*. It is

'Genera Insectorum,' 90 fasc., Acridiidae, Pyrgomorphae, 1909, pp. 3, 4.



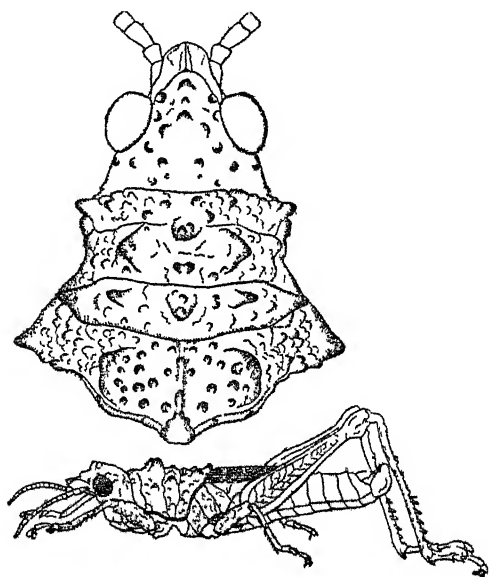
not unlike the genus *Chrotogonus*, but the position of the ocelli and the shape of the prosternum debar it from the section *Chrotogoni*. The armature of the pronotum and the shape of the sternum seem to indicate its relationship to the section *Phymatei*, but, again, the sternum has a well-developed transverse sulcus at the fore margin, which is not the case in *Phymatei*. It seems, therefore, that a special section should be established for this genus, but I prefer to abstain from erecting it, since this might be better done in a revision of the whole subfamily. In any case, the new genus is so peculiar in all its characters that it may be easily recognised from the description without an exact indication of its systematic position.

6. *Phymella capensis*, sp. n. (Fig. 4.)

♂. General coloration yellowish green, with grey design. Antennæ brown, with two basal joints pale. Face with four pale callous tubercles, placed in an arched transverse line just below the median ocellus; margins of the frontal ridge with three pairs of dark olive-green streaks in the lower part. Fastigium of the vertex blackish, with yellowish margins; vertex just behind the transverse sulcus with a rather large, laterally compressed tubercle, obtusely triangular in profile, and with two oblong callosities laterally; between the eyes there is another smaller median tubercle, and sideways and a little behind it a pair of more obliquely placed compressed tubercles, followed by another pair of quite small rounded tubercles nearer to the eyes; all these tubercles are blackish. Pronotum callosorugulose throughout; only the second and third transverse sulci are well developed and deep, while the first is but slightly indicated in the middle of the disc; median keel on the prozona undeveloped, replaced by three blackish tubercles, the first of which is larger than the two others; metazona much shorter than the prozona, with coarse, though not dense, blackish punctures, and with a low straight median keel terminated behind by a laterally compressed blackish tubercle; the disc with a pair of high, strongly laterally compressed, blackish teeth just before the second sulcus and rather near the middle line; a pair of small conical tubercles at the same distance from each other between the second and the third sulcus, and a pair of large, laterally compressed, obtusely triangular teeth on the sides of the disc, directed outwardly; a pair of laterally compressed blackish tubercles on the hind outer angles of the metazona; the hind margin

of the latter obtusely prominent in the middle. Lateral lobes of the pronotum with two small, laterally compressed, pale tubercles on the fore margin, a small blackish, obtusely conical tubercle in the middle of the fore part, a pale-coloured round callous spot at the fore lower angle and irregular pale callosities on the lower part of the metazona. Elytra with cells dark olive-green and veins green, except in the marginal area, which is brownish throughout; an indistinct row of brownish spots along the axillar veins. Wings carmine-red, with the veins in the fore part bluish.

Fig. 4.

*Phymella capensis*, gen. et sp. n.

Abdomen marmorated with blackish, olive-green, and ochraceous spots and dots, with a lateral row of large pale spots. Hind femora with a rather wide olive-green transverse fascia on the upper side, and numerous indefinite spots and dots of the same colour. Hind tibiae muddy green.

♀ (paratype). General coloration brownish ochraceous, with tubercles on the head and pronotum more distinctly blackened, and with markings on the hind femora and abdomen also blackish, instead of dark olive-green, as in the male. The pronotum also bears several quite small black

tubercles between the larger ones, which are exactly like those described in the male.

	♂ (type). mm.	♂ (paratype). mm.	♀ (paratype). mm.
Length of body . . . . .	17	12	22
" head . . . . .	3.75	3	1
" pronotum . . . . .	4.5	3.5	6
" elytra . . . . .	5	3.25	5
hind femora			

The type is from Herbert, Cape Province, 15. v. 1917; two more males are from the same locality; four males (one immature) and three females from Spitzkop, Berkley West, Cape Province, 15. xii. 1917.

This species, like many other Pygostolpina, occurs in two chief colour-forms—one green (as the male type) and another more or less brownish ochraceous (as the described female paratype), which do not differ from each other morphologically. The size is also rather variable, as may be seen from the dimensions given above.

## VII.—Descriptions of new Species of Staphylinidæ from the West Indies. By MALCOLM CAMERON, M.B., R.N., F.E.S.

### PART II.

(Continued from ser. 8, vol. xii. 1913, p. 351.)

#### PÆDLINI.

##### 13. *Lachnophilum inulare*, sp. n.

Black, shining; the abdomen pitchy-black; thorax on either side of the middle with a row of ten or eleven rather small punctures; disc of elytra each with four rows of fine punctures. Antennæ fuscous, the base and apex testaceous; legs fusco-testaceous.

Length 4.5 mm.

In build very similar to *L. dimidiatum*, Say, but the head a little broader and the elytra a little shorter, and the series of punctures finer and more obsolete.

Head subquadrate, a little broader than the thorax, the sculpture consisting of larger and smaller punctures by no means closely placed and still more sparing on the disc. Antennæ with the second joint a little shorter than the

third, the fourth and fifth a little longer than broad, the sixth to the tenth about as long as broad.

Thorax with a dorsal row of ten or eleven fine punctures on either side of the middle, externally with a curved row of six or seven fine punctures, and between this and the lateral margin three or four others. Elytra about as long and as broad as the thorax, with a row of fine punctures along the suture, an obsolete row situated along the middle of the disc. A humeral row of eight or nine punctures of larger size, and just externally a row of very fine obsolete punctures at the reflexed margin. Abdomen pitchy, finely and rather closely punctured and pubescent.

♂. Unknown.

Jamaica. Type in my collection.

#### XANTHOLINI.

##### 44. *Leptacinus parumpunctatus*, Gyll., var. n. *fauveli*.

This variety is distinguished by its bright chestnut-red thorax and straw-coloured elytra, the scutellary and sutural regions only being a little infuscate.

St. Vincent and Grenada (*H. H. Smith*). Type in the British Museum.

##### 45. *Somoleptus clavicapus*, sp. n.

(*Fauvel, in litt.*)

Reddish brown, shining. Head and thorax finely and sparingly punctured; elytra scarcely perceptibly punctured. Legs testaceous.

Length 4 mm.

About the size and build of *S. parvulus*, Shp., but with longer antennæ, the first joint being considerably elongated for so small a species, and much more sparingly punctured fore-parts.

Head oblong, scarcely widened behind, very finely and sparingly punctured. Antennæ with the first three joints testaceous, the first notably elongated for the size of the species, the third a little shorter than the second, the fourth to the tenth strongly transverse. Thorax a little narrower than the head, finely and sparingly punctured. Elytra as long as the thorax, exceedingly finely and sparingly punctured and pubescent. Abdomen finely and sparingly punctured and pubescent. Legs testaceous.

Grenada, Mount Gay Est. (*H. H. Smith*). Type in the British Museum.

46. *Somoleptus unicolor*, sp. n.

Black, shining; the fore parts rather finely and not closely punctured. Antennæ and legs reddish testaceous.

Length 4 mm.

Head (including the mandible-) subtriangular, the temples a little widened behind, the posterior angles rounded, puncturation rather fine and not very close, more sparing posteriorly. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, gradually increasing in width. Thorax a little narrower than the head, longer than broad, widest at the anterior angles, the sides narrowed and a little sinuated posteriorly, rather finely and not very closely punctured, except for a smooth median longitudinal space. Elytra scarcely as long as the thorax, longer than broad, finely, rather obsolete, and not closely punctured, finely pubescent.

Abdomen pitchy-black, the posterior margin of the last dorsal segment pitchy-testaceous, finely but not closely punctured and pubescent.

Jamaica. Type in my collection.

47. *Xantholinus vilis*, Shp., var. n. *fuscipennis*.

Differs only from the type in the blackish first joint of the antennæ and the more obscure coloration of the elytra, which are more or less indeterminately infusate for the anterior half or more, and the darker tibiæ.

Jamaica. Type in my collection.

48. *Xantholinus* (s. str.) *insulatus*, sp. n.

(*insularis*, Fauvel, in litt.)

Black, shining; the elytra pitch-brown. Antennæ with the first joint blackish, the remainder and the legs brownish testaceous.

Length 6.3 mm.

Build and coloration of *X. alticola*, Shp., the head very similarly punctured, but the thorax with the dorsal row of punctures more numerous and smaller, and the elytra much more sparingly punctured.

Head oblong, the posterior angles rounded, puncturation moderately strong, close at the sides and temples, very sparing on the disc; lateral frontal grooves wanting; no visible ground-sculpture. Antennæ with the second joint shorter than the third, the fourth to the tenth transverse,

gradually increasing in breadth. Thorax scarcely as wide as the head, with a dorsal row of ten or eleven rather small punctures, which are somewhat confused anteriorly, a similar row of eight or nine externally, and five or six close to the anterior angles. Elytra a little broader than, but scarcely as long as, the thorax, longer than broad, very sparingly, finely, and obsoletely punctured\*. Abdomen very finely and very sparingly punctured.

Grenada and Mustique (*H. H. Smith*). Type in British Museum.

49. *Diachus perplevus*, sp. n.

(Fauvel, *in litt.*)

Pitchy-brown, shining; thorax with a dorsal row of three small punctures on either side. Antennae with the first three joints, and the legs, yellow testaceous.

Length 2.5 mm.

Very similar in build to *D. nanus*, Er., but the head a little broader behind and the thorax less narrow, the punctures of the head are also more numerous and more in series than in that species.

Head subquadrate, very slightly widened behind, with a row of small, closely-placed punctures internal to the eye on either side, and a few others posteriorly and on the temples. Antennae as in *D. nanus*, Er. Thorax a little wider than the head, cylindrical, with three punctures (the anterior remote and more external) on either side, and four or five near the lateral margin. Elytra a little broader than, but scarcely as long as, the thorax, longer than broad, with three rows of small and obsolete punctures along the disc. Abdomen very finely and moderately closely punctured and pubescent.

Grenada (*H. H. Smith*). Type in the British Museum.

50. *Diachus apicipennis*, sp. n.

(Fauvel, *in litt.*)

Shining, chestnut-red; the apex of the elytra and the abdomen more or less infusate. Thorax with a dorsal series of three punctures on either side. Elytra very sparingly, scarcely perceptibly punctured.

Length 3-4 mm.

Build of *D. nanus*, Er., but with the head less sparingly

\* This puncturation is variable, and is much more distinct in some examples.

punctured and average size larger; the antennæ are similarly constructed and reddish testaceous.

St. Vincent (*H. H. Smith*). Type in the British Museum.

51 *Diachus antennalis*, sp. n.

(Fauvel, *in litt.*)

Reddish testaceous, shining; the head and base of the abdomen often darker, the elytra paler. Antennæ and legs testaceous.

Length 5-5.5 mm.

Build of *D. niger*, Er., but at once distinguished from it and the above-described species by the much longer antennæ, the fourth joint being distinctly longer than broad and the following ones much less strongly transverse. The sculpture differs little from that of *D. niger*.

Grenada (*H. H. Smith*). Type in the British Museum.

STAPHYLININI.

52. *Holius rufoniger*, sp. n.

(*erythroderus*, Fauvel, *in litt.*)

Depressed, black, shining; the thorax and abdomen bright reddish testaceous, the anterior portion of the segments of the latter sometimes more or less infuscate. Elytra pitchy. Antennæ and legs reddish testaceous.

Length 3.3 to 4 mm.

In build similar to *H. atratulus*, Shp., but smaller.

Head black, quadrate, the posterior angles briefly rounded, the front triangularly impressed, and with an oblique impression internal to the eyes on either side, which with the frontal one are moderately coarsely and closely punctured and bound a V-shaped smooth space, the sides moderately coarsely but not closely punctured, the vertex smooth; ground-sculpture firm and strigose. Antennæ with the second and third joints of equal length, the fourth as long as broad, the fifth to the tenth transverse, gradually increasing in breadth, the penultimate twice as broad as long.

Thorax reddish testaceous, narrower than the head, much more finely, but not less closely, punctured than the head, and with a similar ground-sculpture. Scutellum reddish, sparingly and obsoletely punctured. Elytra pitchy-red or pitchy-brown, about half as long again as the thorax, longer than broad, closely and rather finely punctured

and pubescent. Abdomen moderately finely and not very closely punctured and pubescent, the last segment yellow.

Haiti, St. Vincent (*H. H. Smith*). Type in my collection.

53. *Neobisnius limbatus*, sp. n.

Black, shining; the first three joints of the antennæ, legs, and posterior border of the elytra yellow-testaceous.

Length 4 mm.

Build of *N. mixtus*, Shp., and closely allied thereto, but differs in the colour and much closer puncturation of the head, thorax, and elytra.

Head rather coarsely and pretty closely punctured, the front and small space on the vertex smooth. Antennæ with the second and third joints of equal length, the fourth and fifth a little longer than broad, the sixth to the tenth slightly transverse, the eleventh oblong-oval. Thorax a little narrower than the head, narrowed behind, with very similar sculpture to that of the head, except for a narrow smooth impunctate space in the middle which extends throughout the entire length. Elytra as long as, but a little broader than, the thorax, longer than broad, finely and closely punctured and pubescent. Abdomen very finely and closely punctured and pubescent.

♂. Sixth ventral segment with a semicircular excision.

Haiti. Type in my collection.

54. *Neobisnius nigrocæruleus*, sp. n.

Deep black, shining; the elytra obscurely blue-black. Antennæ entirely dark; femora obscurely testaceous, the tibiæ and tarsi pitchy.

Length 5 mm.

Build of *N. concolor*, Shp., but a little smaller; the antennæ more slender; the puncturation of the fore parts less close and with a bluish elytral reflex.

Head (in the ♂) subquadrate, larger; in the ♀ suborbicular, smaller, moderately coarsely and not very closely punctured, the disc narrowly impunctate, the front sometimes with a small longitudinal impression. Antennæ with the second and third joints of equal length, the fourth to the eighth longer than broad and gradually decreasing in length, the ninth and tenth scarcely differing in length and breadth. Thorax, except for the smooth median space, punctured very similarly to the head. Scutellum very finely and sparingly punctured. Elytra as long as the thorax,



rather finely and not very closely punctured and pubescent. Abdomen with the first four visible segments transversely impressed at the base, the impressions rather coarsely and closely punctured; the rest of the abdomen much more finely and much more sparingly punctured; pubescence rather coarse and not very close.

♂. Sixth ventral segment with an acute triangular smooth impression at the posterior margin, which has a shallow emargination corresponding to the base of the impression.

Haiti. Type in my collection.

55. *Neobisnius funerulus*, sp. n.

(Fauvel, *in litt.*)

Black, shining. Antennæ with the first three joints reddish testaceous; legs obscure testaceous, the tibiæ infusate.

Length 4 mm.

Build and coloration of *N. concolor*, Shp., but smaller than that species, with the base of the antennæ lighter, and the head, thorax, and elytra much more closely punctured, though the punctures themselves are of similar size. The second joint of the antennæ is shorter than the third, the fourth to the seventh longer than broad, gradually decreasing in length, the eighth to the tenth about as long as broad.

St. Vincent (*H. H. Smith*). Type in the British Museum.

56. *Philonthus silvaticus*, sp. n.

Very black, shining; the elytra shining bronze-green. Thorax with dorsal row of six punctures\*. Antennæ black, the penultimate joints slightly transverse, the terminal joint clear testaceous yellow. Legs pitchy-brown, the base of the femora sometimes lighter.

Length 6.75 to 7 mm.

Build of *P. rusticus*, Shp., and evidently closely allied thereto; the head, however, though of the same shape, is a little narrower, and, like the thorax, is without metallic reflex; the elytra are much more finely and indistinctly punctured, the legs darker, and the last joint of the antennæ clear testaceous.

Head broader in front, the temples gradually convergent behind, the diameter of the eyes less than their length, the posterior angles broadly rounded; median intraocular punctures widely separated; temples with two or three small

\* According to the enumeration adopted by Erichsen.

punctures, two or three on either side at the base, and four near the posterior border of the eyes, otherwise impunctate and without ground-sculpture. Antennæ with the second and third joints of equal length, the fourth to the seventh a little longer than broad, gradually decreasing in length, eighth scarcely, ninth and tenth slightly transverse, the eleventh nearly as long as the two preceding together. Thorax nearly cylindrical, scarcely narrowed behind, the disc on either side with a row of six evenly placed and moderately large punctures and externally a curved row of three smaller punctures. Scutellum closely and rather finely punctured. Elytra about as long as, but broader than, the thorax, scarcely broader than long, moderately finely and moderately closely punctured and pubescent. Abdomen gradually narrowed behind, the bases of the first three segments closely and moderately coarsely punctured, the rest of the abdomen much more sparingly and more finely punctured and pubescent. Anterior tarsi a little dilated in both sexes; first joint of the posterior tarsi a little longer than the last.

♂. Head broader; sixth ventral segment with a small rounded emargination in the middle of the posterior margin, corresponding to the base of a small triangular impression.

*Hab.* Jamaica. Type in my collection.

57. *Philonthus waterhousei*, sp. n.

(Fauvel, *in litt.*)

Black, shining; head subquadrate, large. Thorax with dorsal row of six punctures. Antennæ with the first two joints reddish, testaceous, the last sometimes reddish; legs testaceous, tibiæ infusate.

Length 4 to 5 mm.

Except for the smaller head this species has the same build as *P. serpens*, Shp., but has the first two joints of the antennæ testaceous, the penultimate joints shorter, and lighter legs.

Head subquadrate, broader than the thorax, the median intraocular punctures widely separated; the finely and sparingly punctured temples a little longer than the diameter of the eyes; vertex and front impunctate, the sides with a few moderate, the base with a few fine, punctures. Antennæ with the second and third joints of equal length, the fourth to the eighth a little longer than broad, gradually decreasing in length, the ninth and tenth scarcely differing in length and breadth. Thorax definitely narrowed behind, longer

than broad, with a row of six moderate punctures on either side of the middle line, and three or four others externally. Scutellum closely and finely punctured. Elytra as long as, but broader than, the thorax, a little longer than broad, moderately finely and moderately closely punctured and pubescent. Abdomen gradually narrowed behind, finely and moderately closely punctured and pubescent, more soaringly behind. Anterior tarsi simple in both sexes; first joint of the posterior tarsi a little shorter than the last.

♂. Head bicarinate; sixth ventral segment with minute emargination in the middle of the posterior margin.

St. Vincent; Grenada (*P. H. Simon*). Type in the British Museum.

53. *Cylindropsyllis*, sp. n.

Narrow, elongate, black, glossy lustrous; the elytra pitchy-black. Antennae and legs dark reddish-testaceous.

Length 3.5 to 5 mm.

This species is very closely allied to *C. sericeus*, var. *pumilus*, Er., of which it has the average size and similar build. It differs, however, in the following respects: the antennae are longer and stouter, the penultimate joint not being transverse but as long as broad, and the fourth and fifth joints longer; the puncturation of the head and thorax is coarser and the sculpture of the elytra rather less fine, as is the puncturation of the abdomen also, and the pubescence is yellowish.

♂. Anterior tarsi distinctly dilated; sixth ventral segment with an acute triangular excision in the posterior margin.

Jamaica. Type in my collection.

59. *Pæderoninus smithi*, sp. n.

(Fauvel, *in litt*)

Shining, dark greenish bronze; the first, second, and last two joints of the antennae, the whole of the last, and the posterior border of the preceding, abdominal segment reddish testaceous; legs yellow.

Length 5.3 to 6 mm.

Head broader than the thorax, suborbicular, the front with deep longitudinal impression, the median intraocular punctures widely separated and situated near the lateral ones adjacent to the eye; vertex and front impunctate, the sides and base with a few large and scattered punctures. Antennae with the second joint a little shorter than the

third, the fourth and fifth a little longer than broad, the sixth as long as broad, the seventh to the tenth transverse, gradually increasing in breadth. Palpi reddish. Thorax longer than broad, narrowed behind, the sides sinuate posteriorly, the disc on either side of the smooth median part with a row of six large punctures, and externally with an irregular group of six others. Scutellum closely punctured. Elytra broader, but scarcely longer than the thorax, scarcely transverse, very coarsely and pretty closely punctured. Abdomen pretty strongly and closely punctured at the base of the first three segments, more finely and sparingly on the rest of the surface; the whole of the sixth and the posterior margins of the rest of the ventral segments reddish testaceous. There appears to be no modification of the sixth ventral segment in the ♂.

St. Vincent (*H. H. Smith*). Type in the British Museum.

60. *Belonuchus cæruleus*, sp. n.

(*smithi*, Fauvel, in litt.)

Shining, blue; the abdomen black, the last two segments bright reddish-testaceous. Antennæ black; legs pitchy-brown.

Length 7 mm.

Very distinct by the greenish-blue head and thorax, blue elytra, and dark abdomen with bright extremity. Head broader than the thorax, quadrate, the front with median impressed line, the sides and base with irregular scattered punctures of rather large size; temples impunctate. Antennæ with the second joint shorter than the third, the fourth as long as broad, the fifth to the tenth moderately transverse, gradually increasing in breadth. Thorax a little longer than broad, narrowed and sinuated at the sides posteriorly; disc on either side of the middle, with a row of five large punctures and two or three externally. Scutellum black, closely punctured. Elytra broader, but scarcely longer than the thorax, about as long as broad, moderately coarsely and pretty closely punctured. Abdomen moderately coarsely and closely punctured at the bases of the first three segments, much more finely and sparingly behind.

♂ unknown.

St. Vincent (*H. H. Smith*). Type in the British Museum.

QUEDIINI.

61. *Alanygnathus antennalis*, Shp., var. n. *heterocerus*.  
(Fauvel, in litt.)

This variety differs only from the type in the clear yellow-testaceous colour of the last two or three joints of the antennæ.

St. Vincent, Grenada (*H. H. Smith*).

TACHYPORINI.

62. *Coproporus sharpi*, sp. n.

Rufo-testaceous, shining; the head and posterior half of the elytra infuscate; first three joints of the antennæ and apex of the last testaceous.

Length 1.75 mm.

Size and build of *C. pulchellus*, Er., but rather more depressed, with differently coloured and exceedingly finely punctured thorax and elytra. Head impunctate; antennæ with the second and third joints of equal length, the fourth scarcely longer than broad, the fifth to the seventh as long as broad and equal amongst themselves, the eighth to the tenth very slightly transverse, the eleventh oval-oblong. Thorax exceedingly finely and indistinctly punctured and with strigose ground-sculpture. Elytra similarly sculptured. Abdomen very finely and pretty closely punctured.

St. Vincent (*H. H. Smith*). Type in the British Museum.

DEINOPSINI.

63. *Deinopsis gracilis*, sp. n.

Narrow, elongate, attenuate posteriorly, opaque reddish-brown, densely and finely punctured, sericeous. Antennæ and legs pale testaceous.

Length 2.5 mm.

Of similar colour to *D. angusta*, Shp., but narrower and more fragile, the antennæ more slender, the pubescence finer and more sericeous. Head transverse, densely and finely punctured and pubescent. Antennæ with all the joints considerably longer than broad. Thorax strongly transverse, narrower in front, the sides gently rounded, the base bisinuate, very densely and finely punctured and pubescent. Elytra as long as and scarcely broader than the thorax, exceedingly finely and densely punctured and

pubescent. Abdomen pointed, the posterior margins of the second to the fifth segments narrowly black, and presenting a row of contiguous short oblong impressions, so that the margin appears crenulate.

St. Lucia. Type in my collection.

#### OLIGOTINI.

##### 64. *Oligota (Holobus) laevata*, sp. n.

(Fauvel, *in litt.*)

Minute, black, shining, convex. Antennae short, the club 3-jointed. Antennae and legs entirely yellow.

Length .75 mm.

Smaller and less robust than *O. centralis*, Shp., and differs also in the club of the antennae being more slender, the practically impunctate thorax, and the much more sparing puncturation of the elytra.

Grenada (*H. H. Smith*). Type in the British Museum.

##### 65. *Oligota (Holobus) smithi*, sp. n.

(Fauvel, *in litt.*)

Minute, black, shining, convex; the antennae, legs, and last two segments of the abdomen yellow. Antennae short, the club 3-jointed.

Length .75 mm.

Size and build of the preceding, but at once distinguished from it by the bright yellow apex of the abdomen; the thorax is, moreover, quite distinctly (though very finely) and pretty closely punctured, and the elytra much more closely punctured.

Grenada (*H. H. Smith*). Type in the British Museum.

##### 66. *Oligota* (s. str.) *maculicornis*, sp. n.

Shining, castaneous. Antennae with 3-jointed club, the eighth and ninth joints black, the remainder testaceous. Legs testaceous.

Length 1 mm.

Build of *O. atomaria*, Er., but of a uniform light chestnut-brown colour.

Head exceedingly finely and sparingly punctured and pubescent. Antennae short, the first and second joints of equal length, the third to the sixth very small, moniliform, the seventh slightly transverse, the eighth and ninth much broader than the preceding, about two and a half times as broad as long, the tenth short, oval. Maxillary palpi pitchy.

Thorax very finely and not very closely punctured and pubescent. Elytra a little longer and broader than the thorax, transverse, very finely and rather sparingly punctured and pubescent. Abdomen very finely and moderately closely punctured and pubescent, a little more sparingly on the last two segments.

Haiti. Type in my collection.

67. *Oligota* (s. str.) *rufa*, sp. n.

Shining, red. Antennæ dark, the first two joints testaceous, the club 3-jointed. Legs testaceous.

Length 1 mm.

Size and build of the preceding, but colour darker and more reddish, the antennæ differently coloured, and the elytra much more sparingly punctured. Head exceedingly finely and sparingly punctured. Antennæ constructed as in the preceding. Maxillary palpi pitchy. Thorax exceedingly finely and rather sparingly punctured. Elytra a little longer and broader than the thorax, transverse, exceedingly finely and very sparingly punctured. Abdomen with the sixth and seventh segments obscurely pitchy, very finely and sparingly punctured.

St. Lucia. Type in my collection.

HYGRONOMINI.

68. *Barychara flavipennis*, sp. n.

Black, shining, convex, attenuated behind; the elytra bright yellow, the last two abdominal segments reddish-testaceous. Legs and antennæ testaceous.

Length 1.5 mm. (in well-extended examples).

Resembling *B. filicornis*, Shp., in build, but rather less robust. Head very finely and sparingly punctured and pubescent. Antennæ as in *B. filicornis*, the third joint shorter than the second, the fourth scarcely longer than broad, the fifth to the tenth all distinctly longer than broad and increasing but little in thickness from the sixth, the eleventh elongate, as long as the two preceding together. Thorax very finely and not closely punctured and pubescent. Elytra as long as, but a little broader than, the thorax, transverse, very finely and rather more closely punctured than the thorax, finely and distinctly pubescent. Abdomen gradually attenuated, finely and rather closely punctured, more sparingly on the last two segments; pubescence rather stiff, the sides and apex with stout black setæ.

Haiti. Type in my collection.

69. *Alisalia picea*, sp. n.

Elongate, somewhat depressed, greasy-shining, brown; the head and abdomen black, the apex of the latter brownish-testaceous. Antennæ reddish-brown. Legs testaceous.

Length 2 mm.

Larger, broader, more robust, less parallel, and less shining than *A. brunnea*, mih. Head scarcely transverse, the eyes moderate, their diameter shorter than that of the temples; the posterior angles broadly rounded, the vertex with a rounded impression; puncturation fine and close, finely pubescent. Antennæ with the third joint as long as the second, the fourth to the tenth transverse, gradually increasing in width, the penultimate two and a half times broader than long. Thorax distinctly transverse, broader than the head, brown, widest a little behind the anterior angles, the sides from thence rounded and contracted anteriorly, more strongly narrowed behind to the obtuse posterior angles, the puncturation rather finer and distinctly less close than that of the head, finely pubescent. Elytra a little longer and broader than the thorax, slightly transverse, exceedingly finely and closely punctured and pubescent. Abdomen nearly parallel, very finely and pretty closely punctured and pubescent in front, rather more sparingly on the last two segments.

Haiti. Type in my collection.

70. *Alisalia brunnea*, sp. n.

Narrow, elongate, parallel, depressed; head and abdomen black, the apex of the latter testaceous; thorax and elytra brown; first three joints of the antennæ and legs testaceous.

Length 1.75 mm.

Head as broad as long, the eyes small, the temples long, bordered below, the posterior angles rounded; extremely finely and closely punctured, and finely pubescent. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate about half as broad again as long. Thorax brown, slightly transverse, widest just behind the anterior angles, the sides from thence rounded and narrowed anteriorly, more strongly narrowed in a nearly straight line posteriorly to the obtuse posterior angles; puncturation still finer than that of the head and not quite so close. Elytra a little longer and a little broader than the thorax, slightly longer than broad, infusate, extremely finely and



closely punctured and pubescent. Abdomen parallel, pitchy-black, extremely finely and moderately closely punctured and pubescent, rather more sparingly behind.

Haiti. Type in my collection.

GNYPETOSOMA, gen. nov.

Mandibles rather stout, curved, pointed, the right with a small blunt tooth about the middle of the inner border, finely crenulated between this and the apex. Maxillary palpi 4-jointed, the first joint small, the second narrow at the base, gradually but slightly enlarged towards the apex, the third distinctly longer than the preceding and similarly enlarged, the fourth very small, subulate. Inner lobe of maxilla with nine or ten strong and moderately long pectinations along the inner margin in front and five or six much finer ones posteriorly; outer lobe narrow and pointed, the apex ciliate. Tongue short-oval, anteriorly with a very small emargination. Labial palpi 3-jointed, the first joint short and stout, about half as long again as broad, the second much narrower than the first, scarcely longer than broad, the third narrower than, and double as long as, the preceding.

Temples not bordered below. Neck about one-fourth the greatest breadth of the head. Mesosternum narrow and pointed, extending about one-half the arcs formed by the inner edges of the middle coxæ, which are narrowly separated. Metasternal process bluntly rounded in front, not nearly meeting the mesosternal process. Tarsi 4, 4, 4. The anterior pair with the first three joints short and equal, the fourth as long as the three preceding together; the middle pair with the first three joints gradually decreasing in length, the first of them a little shorter than the two following together; posterior pair with the first joint elongate, as long as the two following together, the second and third of equal length. All the claws sharply angled near the base. Tibia ciliate. Elytra scarcely sinuate internal to the postero-external angle.

This genus would appear to be closely allied to *Caloderella*, Bernh., but to differ in the structure of the labial palpi, the tongue, and the posterior tarsi.

71. *Gnyptosoma calocera*, sp. n.

(*Schistoglossa calocera*, Fauvel, in litt.)

Black, shining, the elytra obscurely pitchy. Antennæ testaceous, the third to the fifth joints infusate. Legs testaceous.

Length 3 mm.

Somewhat resembling in build *Gnypeta laticollis*, Latr., but much smaller.

Head transversely suborbicular, the diameter of the eyes less than the length of the temple, which passes insensibly into the base; the clypeus with a small impression; very finely and pretty closely punctured and pubescent. Antennæ with the second and third joints of equal length, the fourth to the seventh scarcely longer than broad, the eighth to the tenth scarcely transverse, the eleventh as long as the two preceding together. Thorax a little transverse, wider than the head, broadest just behind the anterior angles, the sides rounded and narrowed from thence anteriorly, more strongly narrowed in a nearly straight line to the obtuse posterior angles; more finely and closely punctured than the head and finely pubescent. Elytra a little longer and broader than the thorax, square, very finely and closely punctured and pubescent. Abdomen scarcely narrowed behind, very finely and very closely punctured and pubescent, more sparingly on the seventh and eighth segments.

St. Vincent (*H. H. Smith*). Type in the British Museum.

72. *Gnypetozona farrea*, sp. n.

(*Salistoglossa farrea*, Fauvel, *in litt.*)

Parallel, black, scarcely shining; the clytra brown. Antennæ reddish brown. Length 2 mm.

Length 2 mm.

Smaller, more parallel, more opaque, the thorax more transverse and less narrowed behind than in the preceding species.

Head very finely and densely punctured, with close and fine pubescence. Antennæ with the third joint scarcely shorter than the second, the fourth to the tenth transverse gradually increasing in breadth, the penultimate about twice as broad as long. Thorax transverse, widest a little behind the anterior angles, the sides from thence rounded and narrowed in front and contracted slightly backward, in a nearly straight line to the rounded posterior angles; puncturation and pubescence as on the head. Elytra as long as, but a little broader than, the thorax, slightly transverse, exceedingly finely and rather closely punctured and pubescent. Abdomen parallel, exceedingly finely and pretty closely punctured, pubescent throughout.

St. Vincent (*P. H. Smith*). Type in the British Museum.

[To be continued.]

VIII.—*On some Earthworms from India and Palestine belonging to the British Museum.* By J. STEPHENSON, M.B., D.Sc., Lecturer in Zoology, University of Edinburgh.

ON recently reading a paper by Mr. C. R. Narayan Rao, of the University of Mysore, on "The Anatomy of some new Species of *Drawida*," in the November number of this Magazine (Ann. & Mag. Nat. Hist. ser. 9, vol. viii. No. 47, Nov. 1921, p. 496), I was struck by the extraordinary characters of the worms; a number of their peculiarities seemed to be altogether irreconcilable with what we know of the anatomy of this genus, and I felt that I could not possibly admit Mr. Rao's species into the volume I am preparing on the Indian Oligochaeta for the 'Fauna of British India' series without some corroboration of these anomalous features. I accordingly applied to the British Museum, where Mr. Rao has deposited his types, to have these sent to me. The Museum authorities very kindly sent me the worms, and I owe them my thanks for so promptly acceding to my request.

I find, as I had suspected, that Mr. Rao's accounts are in many respects incorrect, and especially so where they describe characters otherwise unknown in the genus. I take one of his worms—the first—as an example.

The specific name is spelt differently in his paper (*soma-varpatana*) and on the label (*somvarpatana*); the place where it was taken is called Somavarpatana in the paper, Somvarpat on the label; the number of segments is given as 80-90, but the type-specimen has 124. The male pores are said to be large slits; I find them to be not slit-like, but puckered orifices with tumid lips. Unlike Mr. Rao, I was unable to distinguish externally the female and spermathecal pores; but from internal examination the spermathecal pores are considerably further from the middle line than is stated by him. The gizzards are (as always in the genus) segmental structures, and the three present in the type-specimen occupy segments xvi.-xviii. Mr. Rao, however, apparently thinks that the gizzards in this genus may take up more than one segment, and in this species, according to him, the three to five gizzards occupy segments xiv.-xxi.

Mr. Rao describes two pairs of sperm-sacs (such a character would at once remove the worm to another genus), the first pair suspended by septum 8/9 or connected with 8/9 (an unknown position for the sacs), while the second pair are said to "lie in somite x., having very early in development detached themselves from the septum 9/10."

There appears to be absolutely no warrant for this statement of what takes place in early development, and the condition so described would be totally without precedent. On examination there is found to be here, as always, only one pair of testes or sperm-sacs, attached to septum 9/10.

The prostate is said to be a comparatively small spherical structure. It is, in fact, a very large and conspicuous object, and is remarkable in being bifid. It would appear that Mr. Rao has mistaken these prostate glands for the "second pair of sperm-sacs."

There is an "ovarian chamber" (modified eleventh segment) which is not mentioned by Mr. Rao. It would be impossible in this genus for the egg-sacs to be suspended, as Mr. Rao says, from septum 10/11; the ovaries are throughout in segment xi. (or in a chamber which represents this segment narrowed and modified in form), and the ovisacs are posterior bulgings of septum 11/12 (or of the posterior wall of the chamber).

Mr. Rao gives lengthy descriptions of the microscopical structure of a number of the organs of this worm and of some of the others. The condition of the British Museum specimens, at any rate, does not seem to me to be such as to make detailed histological description advisable. Mr. Rao, however, describing certain glandular finger-shaped "alimentary appendages," gives an account, not easy to understand, of their development; certain muscular fibres of the gut-wall change their character and, becoming metamorphosed, give rise to the glandular processes, one process being derived from a single muscular fibre. The cells fringing the adult processes are compared to the solenocytes of *Polychæta*; and there is said to be histological affinity between these enteric appendages of *Drawida* and the "enteronephridia" of *Pheretima*; indeed, diagrams are given to illustrate the evolution of septal nephridia from enteric appendages such as those of these worms—in this process of evolution the supra-intestinal blood-vessel becomes an excretory duct. The main function of the alimentary appendages is supposed to be that of storing water.

Without remarking on the numerous other structures which are described by Mr. Rao, I might perhaps mention that in the same species to which the above refers, the spermathecal atrium is figured as having an *outer* chitinous layer (*i. e.*, on its *peritoneal* surface), and is described in the text as having an outer tunic which is a thin cuticular layer.

Such extraordinary morphological ideas need not be seriously discussed. I do not think it is too much to say

that Mr. Rao's competence in morphological work is of the same degree of reliability as that which he shows in his systematic descriptions.

It is unnecessary to point out the errors in Mr. Rao's accounts of the four other species. They are of the same fundamental character as those I have noted above in his description of *D. somavarpatana*. Instead, it will, I think, be preferable simply to give short accounts of the worms themselves.

I may note that *D. scandens* is the same worm as one of which I have recently written a description, which is appearing in the 'Records of the Indian Museum,' under the name of *D. ravi*. Mr. Rao's name has the priority, and the name of *D. ravi* must be withdrawn.

I add to these descriptions an account of two species of earthworms which I received for identification some little time ago from the British Museum. These were collected by Mr. T. Aharoni; one species is already known, while the other appears to be new.

*Drawida somavarpatana*, C. R. N. Rao.

Length 85 mm.; diameter in middle of body 4 mm. Segments 124. Colour brownish yellow. Prostomium small, retracted under segment i. No dorsal pores. Nephridiopores in the line of the lateral setæ.

Setæ closely paired;  $aa=bc$ ;  $dd=\frac{1}{2}$  circumference.

Clitellum apparently comprising segments x.-xiii. (= 4), but indistinct. The male pores are puckered orifices with tumid lips, situated a little outside the line of setæ *b*; in front of and behind each is a curved depression, the concavities facing each other, the anterior on segment x., the posterior on xi.; the mid-ventral regions of these two segments are depressed. The female and spermathecal apertures were not visible on external examination, but on dissection the spermathecal apertures were found to be in the line of the lateral setæ.

Septa 5/6-8/9 are slightly thickened. There are three gizzards (in the type-specimen), in segments xvi.-xviii., of which the last is the largest. A double series of white dendritic appendages are seen lying dorsally, segmentally arranged, on the intestine; these are somewhat reminiscent of the lymphatic glands of *Pheretima*, but the condition of specimens is too poor to allow of further examination. The last hearts are in segment ix.

The testis-sacs have the disposition which was described by Michaelsen in *D. ghatensis*; the main portion of the sacs occupies segment xiv., and is connected to septum 9/10

by a narrow neck. The prostates are of peculiar shape; each consists of two cylindrical or finger-shaped structures, which lie side by side and are slightly curled; these unite below, near the ventral body-wall, in a narrow neck, which again swells out somewhat at its termination, where it joins the parietes. The whole is a conspicuous object in segment x., on each side of the gut; the surface is soft, and a friable layer can easily be detached from the finger-shaped projections, disclosing a firm, shining, and evidently muscular axis, no doubt with a lumen in its centre. The junction of the vas deferens with the prostate was not seen.

There is a definite ovarian chamber, and the ovisacs are large, extending back to segment xiv.

The spermathecal ampulla is a somewhat ovoid sac. The duct forms a large coil projecting into segment viii.; the atrium is bifid, and consists of two horns of moderate size, one in segment vii. and one in viii., the duct joining in the angle between the two horns. The horns of the atrium are firm and shining; the exit to the surface is in the line of the lateral setæ.

There are strong transverse muscular bands on the inner surface of the body-wall in the prostatic region, to the contraction of which the depressions on the ventral surface of the genital region are doubtless due.

Somvarpat, 4000 ft., Coorg, S. India.

*Drawida scandens*, C. R. N. Rao.

Length 38-43 mm.; maximum diameter 1.75 mm., average 1.5 mm. Segments ca. 144-161. Colour brown, anterior end rather lighter. Prostomium probolous. No dorsal pores. Nephridiopores not seen.

Setæ in anterior part of body very large for so small a worm, especially the ventral setæ from segment iv. backwards and the lateral from x.; *aa* is approximately equal to *bc*, and *dd* is rather more than half the circumference.

Clitellum not distinguishable. In groove 9/10 is a transversely elongated cushion, somewhat dumbbell-shaped and divided by a mid-ventral fissure into two; laterally this cushion extends to a point between the lines of setæ *b* and *c*, but nearer the line *c*. The ventral surface of segment xi. is thickened, and groove 10/11 is pushed forwards; the lateral extent of the thickening is about the same as that of the cushion in groove 9/10.

There are two pairs of male pores; one pair is on the cushion in 9/10, rather outside the line of setæ *b*; these belong to a second pair of prostates seen internally in segment ix. The other pair of male pores are near the antero-

lateral angles of the cushion of segment vi., also just outside the line of setæ *b*; since the groove 10/11 is pushed forwards by the thickened area, these pores occupy a position which would be in the groove if this had its normal position.

The female pores are possibly between the lines of *a* and *b* in groove 11/12. The spermathecal pores were not distinguishable externally; from internal examination they pierce the body-wall in line with the ventral setæ.

Septa 6/7-8/9 are somewhat thickened. There are three gizzards in segments xiii.-xv., and perhaps a rudimentary gizzard in addition in segment xii. The last hearts are in segment ix., but anteriorly in segment x. a large branch is given off on each side from the dorsal vessel, and passes obliquely downwards and backwards behind the testis-sac to the ventral body-wall.

The testis-sacs are one pair, projecting mostly into segment x. The prostates are upright sausage-shaped structures, slightly curved round the gut; their surface is soft; the vas deferens joins the prostate low down on its inner face, and can be seen to ascend for some distance on the gland. An exactly similar pair of prostates is present in segment ix.

The presence of an ovarian chamber is, in the type-specimen, doubtful on account of its condition. The ovisacs are finger-shaped, and extend back to segment xii. or xiii.

The spermathecal ampulla is small and subspherical. The atrium is large, ovoid, and sac-like, in segment vii.; its surface is soft, not muscular, and it narrows to its attachment to the body-wall in line with the ventral series of setæ; the duct joins the atrium near its base on the posterior side.

Bhagamandla, 4000 ft., Coorg, S. India.

*Drawida elegans*, C. R. N. Rao.

Length 130 mm.; diameter a little behind the middle 5 mm. Segments 206; viii.-xviii. bi- or triannular; the first two segments very short. Colour a nondescript grey, non-pigmented. Prostomium retractile, prolobous. No dorsal pores. Nephridiopores in the line with the lateral setæ.

Setæ closely paired;  $aa = bc$ ;  $dd = \frac{1}{2}$  circumference.

Clitellum not definitely distinguishable. Male pores small, a little outside the line of setæ *b*. Female pores minute, in the line of *b*. Spermathecal pores just below the line of *c*.

Septa 5/6-8/9 exceptionally stout. Five gizzards, in segments xii.-xvi., the first rudimentary. Alimentary

appendages seem here to be an aggregate of vascular twigs. Last hearts in segment ix. One pair of nephridia per segment.

Testis-sacs moderately small, ovoidal, depending into segment x. The vas deferens is a very large coil, many times as bulky as the testis-sac itself, in segments ix. and x.; it then runs along the inner border of the prostate, which it enters near the ental end of the latter. The prostates are of moderate size, elongated, and lying backwards, somewhat compressed so as to approximate to a tongue-shape; there is no stalk, each being almost as thick at its attachment to the body-wall as elsewhere.

There is a complete ovarian chamber. The ovisacs are small, in segment xii.; their hinder end is much narrower, and is bent forwards or transversely.

The spermathecal ampulla is a small ovoid sac; the duct is much coiled, and lies on the posterior face of the septum; it pierces the septum low down, and mounts to enter the centre of the upper surface of the atrium. The atrium is large, much larger than the ampulla; it is shortly pear-shaped, with the narrower end on the body-wall; the upper end is depressed where the duct enters.

Bhagamandla, 4000 ft., Coorg, S. India.

*Drawida modesta*, C. R. N. Rao.

Length 75 mm.; diameter 4 mm. Segments ca. 207, very short, especially towards the hinder end. Colour brown. Prostomium? (destroyed). Dorsal pores absent. Nephridiopores apparently in line with setæ *d*.

Setæ closely paired;  $au=bc$ ;  $dd=\frac{1}{2}$  circumference or slightly more.

Clitellum not established. The male area resembles that of *D. somavarpulana*; the male pores have prominent anterior and posterior lips, and are themselves just outside the line of setæ *b*. There are transverse groove-like depressions in front of and behind the pores, on segments x. and xi. respectively. The mid-ventral regions of segments x. and xi. are somewhat depressed.

Female pores?

Spermathecal pores slightly outside the lines of *b*; rather further outside than the male pores. A slightly elevated transversely oval flat papilla, brown in colour, is present just in front of each spermathecal aperture, taking up in longitudinal extent a length equal to two-fifths of the segment, and extending laterally from midway between the lines *a* and *b* to midway between the lines *b* and *c*.

Septa 5/6-8/9 thickened. There are two gizzards, in xii. and xiii.; there is, in addition, a slight thickening of



the œsophagus in xi. Some finger-shaped alimentary appendages are present. The last heart is in segment ix.

The testis-sacs are large, and project into segments ix. and x. The prostates are small, soft, transversely oval cushions, sessile on the body-wall; the vasa deferentia join their anterior borders.

An ovarian chamber appears to have been present, with the ovary on its anterior wall. The ovisacs extend back to segment xiii.

The spermathecal ampulla is somewhat polygonal from the pressure of surrounding parts. There is no visible atrium.

It is necessary to speak with some caution as to the internal anatomy of this species, as the single specimen has been much pulled about.

Moornad, Coorg, S. India.

*Drawida paradoxa*, C. R. N. Rao.

Length 90 mm.; average diameter 3 mm. Segments 152; segment i. is very small—a very narrow ring. Unpigmented, colour light grey. Prostomium prololobous. No dorsal pores. Nephridiopores not visible.

Setæ small, closely paired; *aa* in general = *bc*, but in the post-clitellar region =  $\frac{2}{3}bc$ ; *dd* is slightly less than  $\frac{1}{2}$  circumference.

Clitellum not visible. Male pores small, inconspicuous, just outside the line of *b*.

Female pores not visible.

Spermathecal pores small, in line with setæ *c*.

Septa 5/6–8/9 considerably thickened. Four gizzards, in segments xiii.–xvi., the first smallest, the last largest (in the second specimen the gizzards are in segments xii.–xv.; the first is rudimentary, the last largest). The last heart is in segment ix.

There is one pair of testis-sacs, of moderate size, sub-spherical in shape, depending into segment x. The vas deferens is a relatively very large coil, partly in segment ix. and partly in x.; it comes into relation with the prostate near the base of the latter, and can be traced some distance up its anterior border before it becomes lost in the soft furry prostatic investment. The prostates are of considerable size; the larger part of each is flattened from side to side, the edges being soft, opaque, and white, and the axial portion more shiny (in other words, the “glandular” investment of the muscular tube is confined to the anterior and posterior borders of the latter); the ectal portion of the prostate is a twisted mass, bound together by connected tissue and adherent to the ventral body-wall.

An ovarian chamber is present; the ovaries are prominent fringed projections on the anterior wall. The ovisacs are small projections into segment xii.

The spermathecal ampulla is small and sub-spherical; the duct is not much coiled. The atrium, in segment vii., is a large tongue-shaped structure, with a constriction a quarter or one-third of its length from the body-wall; the margins of the atrium are slightly lobed; the duct joins its lower portions.

Madapur, 3500 ft., Coorg.

*Helodrilus (Dendrobæa) samariger* (Rosa).

Huldah, Judæan Mountains; 5. iv. 1921 (*T. Aharoni*). A single specimen, mature. Called the "dew-worm." (234 B.M.)

*Helodrilus (Allolobophora) aharonii*, sp. n.

Rechoboth, Palestine. Three specimens, in poor condition (*T. Aharoni*). (219 B.M.)

The longest specimen is 105 mm. long and 4 mm. in diameter. Segments 1-41. Colour light brown, no difference between dorsal and ventral surfaces. Prostomium minute, tanylobous, with, however, a transverse groove across the tongue one-third of the way back. Dorsal pores exist from groove 6/7 backwards.

The setæ are very closely paired;  $aa=1\frac{1}{2}bc$ ;  $dd$  is rather less than half the circumference.

The clitellum is not very distinct, but appears to take up nine segments, xxx.-xxxviii., with a "wall" which embraces segments xxxiii.-xxxvii. The male pores are indistinctly indicated as whitish thickenings on segment xv., between the lines of  $b$  and  $c$ . The ventral setæ of segments x., xi., and xii. are on whitish cushions.

Septum 5/6 is somewhat thickened, 6/7, 7/8, and 8/9 are much thickened, 9/10 and 10/11 somewhat so, and 11/12 slightly.

Calciferous glands are present in segments x., xi., and xii. The gizzard probably occupies segments xvii. and xviii., but the septa are so thinned as to be almost unrecognizable. The last hearts are in segment ix.

The male funnels are in segments x. and xi., and appear to be free (a delicate testis-sac would, however, in the condition of the specimens not have been distinctly recognizable). Seminal vesicles are present in segments ix, x., xi., and xii.; those in ix., xi., and xii. are large and only slightly lobed; those of segment x. are very much smaller. Spermathecae, small and spherical, are present in line with the lateral setæ, opening in 9/10 and 10/11.

IX.—*Hitherto undescribed Platypodidæ and Scolytidæ from Portuguese East Africa.* By Lt.-Col. WINN SAMPSON, F.E.S.

A NUMBER of specimens from Portuguese East Africa, collected by Mr. C. B. Hardenberg, having been handed to me by the Director of the Imperial Bureau of Entomology for determination, the following appear to be new species:—

*Crossotusius hardenbergi*, sp. n.

♂. Head and prothorax dark brown; elytra dirty yellow, darker towards the apex. *Front* flat, shagreened surface lightly punctured on the upper half and more deeply on the lower, with a slight median longitudinal depression and obscure stræ below the eyes, the latter being sharply depressed on their inner sides; the whole surface sparsely hairy and with a row of yellow hair above the mouth; the vertex has a clearly defined edge with a strong central carina, the surface on each side being dull and granulate, becoming polished and somewhat swollen, with irregularly placed and various-sized umbilical punctures towards and above the eyes. *Prothorax* oblong, anteriorly dull, the rest of the surface polished, with scattered umbilical markings and small punctures, especially towards the posterior edge and on each side of the central longitudinal groove, which extends from close to the base for one-fourth the length of the prothorax, preceded by a faintly marked ridge reaching nearly to the anterior margin. *Elytra* (fig. a) the same breadth as and one-half longer than the thorax, striate-punctate, the first stria rather deeply and closely punctured; the interspaces faintly uniseriate-punctate, the third not broadened basally; the first, second, and third coalesce apically, forming an oblique truncate edge, the outer acute angle extending beyond the remaining interspaces, the fourth narrowed and terminating before reaching the apex; the fifth is obliquely truncate, broadened apically, and nearly the same length as the sutural angle; the sixth is slightly shorter, narrowed, and apically obtuse; the seventh transversely truncate and equal in length to the sixth; the eighth shorter than the seventh and obtusely rounded; the ninth is the same length as the seventh and twice as broad as the eighth, and obliquely truncate, the outer angle being very acute. *Abdomen* (fig. b) with the first and second visible segments centrally depressed, the excavation in the second having the sides slightly divergent as far as the inner posterior angles, and then rounded and fringed with hair, becoming incurved

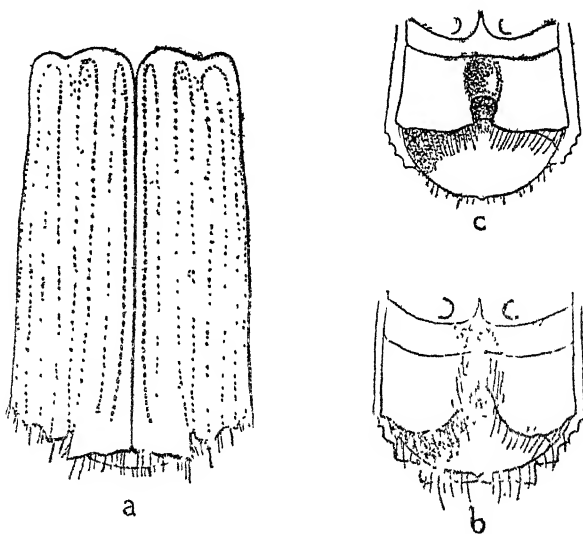
laterally, and ending in an acute spine at the outer angle; the metasternal femoral depression is dentate at the margin.

*Length* 4.9–5.1 mm.; *breadth* 1.1 mm.

PORTUGUESE EAST AFRICA: Xinavane (*C. B. Hardenberg*).

*Type* in the British Museum.

♀. Resembles the male in colour, but is rather darker, especially on each side of the elytral suture and at the base and apex. *Front* shiny and sparsely hairy, the surface irregular, produced forwards centrally just before the vertex, but depressed laterally as far as the eyes, which have their inner sides



*a, b. Crossotarsus hardenbergi*, sp. n. *c, Crossotarsus opifex*, sp. n.

sharply depressed and slightly excavate, thus causing an angle at the upper inner edge; the upper half of the front is faintly punctate, the lower portion having deeper and closer punctures and being provided with upstanding matted hairs, together with two tufts of long recurved hairs over the mouth; on the inner edge of the eyes there is a row of recumbent hair extending towards the centre; the vertex has a somewhat sharply defined and semicircular lateral ridge, which forms the upper margin to a depression situated close to the upper portion of each eye; the central carina is prominent and extended forwards and downwards, the surface

on each side being dull, but becoming shiny and somewhat swollen towards the eyes, the whole being more or less variolous. *Prothorax* oblong, anteriorly dull and posteriorly shiny, the central longitudinal line commencing near the base and extending more or less to the centre, irregularly variolous and punctured. *Elytra* the same breadth as and three-fourths longer than the prothorax; striate-punctate, the sutural stria depressed and deeply punctured, the interstices furnished with fine uniseriate punctures, becoming rugose and hairy towards the apex; the base of the third and fifth interstices elevated, broadened, and transversely carinate, the apical depression short, excavate on each side of the suture, but not extending to the lateral margins. *Abdomen* arched, except the fifth segment, which is concave, with a very slight central elevation, and with the apical edge raised so as to form two lateral processes, one on each side of the centre, which are apically narrowed and excindid; the metatarsal femoral cavity is minutely denticulate.

*Length* 5.3–5.7 mm.; *breadth* 1.3 mm.

PORTUGUESE EAST AFRICA: Xinavane (*C. B. Hardenberg*).

The lateral depression close to the upper portion of the eyes is almost obsolete in some specimens, and the curvature of its upper edge varies considerably; the frontal hairs are frequently almost worn away. Very similar to *C. crinitus*, Chap., but with different elytral sculpture etc. in the male and distinct abdominal characters etc. in the female.

*Crossotarsus opifex*, sp. n.

♂. Head and prothorax reddish brown; elytra dull yellow, darker towards the apex. *Front* flat, shagreened surface with large shallow punctures on the upper two-thirds, central longitudinal depression short; coarsely punctured, with a small tuft of yellow hair over the mouth; a longitudinal central carina on the vertex, which is sharply defined anteriorly and closely covered with oblong, shallow, umbilical punctures. *Prothorax* oblong, dull anteriorly, with a transverse row of irregularly placed shallow depressions, the rest of the surface shiny, irregularly and sparsely punctured, with a longitudinal central groove extending about one-third from the base, and furnished on each side with an irregular double row of punctures. *Elytra* of equal breadth and twice as long as the prothorax, striate-punctate, the sutural stria having the largest and deepest punctures, the interstices flat, with obscure and irregular punctures; the first and third

interstices more or less truncate apically, and longer than the others, the third being broadened before the apex and also slightly at the base and punctured; the second and fourth are narrowed and not continued to the apex, the fifth longer than the remainder and transversely truncate; the sixth and seventh are of equal length, but the latter is the broadest; the eighth is longer and narrower than the ninth, both being transversely truncate. *Abdomen* (fig. c): the cavity in the second abdominal segment has the sides almost parallel or slightly incurved as far as the inner posterior angles, and is then rounded and fringed with hair, becoming, however, slightly sinuous laterally, and ending in a minute spine; the metasternal femoral depression is marginally denticulate.

*Length* 3.9 mm.; *breadth* 1 mm.

The female is very similar to that of the preceding species, but differs chiefly in the much smaller size, the flatness of the front, and the absence of the depression over the eyes, and is much paler in colour.

*Length* 4.2-4.5 mm.; *breadth* 1 mm.

PORTUGUESE EAST AFRICA: Xinavaue (*C. B. Hardenberg*).

*Type* in the British Museum.

This and the preceding species belong to the group *Crosso-tarsi Abdominales*, Chap.

*Platypus penetralis*, sp. n.

♂. Brown. *Front* flat, the surface areolate; vertex rounded, with a shining, central, longitudinal carina, and laterally closely covered with oblong areolations and a few hairs. *Prothorax* oblong, shiny, more or less evenly punctured, the basal longitudinal carina extending to the basal third. *Elytra* punctate-striate, the striæ being deeply and closely punctured, the interstices very minutely punctured, becoming rugose and hairy towards the apex; the first interstices smooth, shiny, and strongly carinate, slightly divergent towards the apex, but becoming parallel before the termination, the third having a shiny broadened base, the terminal prolongation having the superior spine straight, the external one longer, curved outwards, and pointed, the inferior being obtusely rounded. *Legs*: the anterior tibiæ very hairy and carinate exteriorly.

*Length* 4.5 mm.; *breadth* 1 mm.

♀. Pale yellow, front and elytral apex rather darker. *Front* transversely striate from between the eyes to the epistoma, the striæ becoming finer below the central transverse

depression, the upper portion of the front arcolate, the vertex having a prominent central carina and being furnished laterally with closely placed longitudinal striæ. *Prothorax* oblong, with a median longitudinal groove on the basal third and a single large pore on each side of it close to the anterior extremity, whilst nearer the base there are several piliferous punctures, the whole surface being irregularly punctured on a rimose ground. *Elytra* striate-punctate, the sutural striæ being the most deeply impressed, the interstices flat and shiny, the base of the third broadened, carinate transversely, and slightly raised.

*Length* 4·8 mm.; *breadth* 1 mm.

PORTUGUESE EAST AFRICA: Xinavane (C. B. Hardenberg).

*Type* in the British Museum.

The male is closely allied to *P. melanurus*, Chap., but the females of that species are without prothoracic pores; on the other hand, the female above described is very similar to *P. subaurifrons*, Chap., but in the division to which that species belongs both sexes have prothoracic pores.

### *Cryphalus deuter*, sp. n.

Pitch-black, prothorax reddish on the dorsal surface, legs and antennæ dull brown. *Front* subconvex, shiny and rugose, towards the vertex rimose; sparsely hairy and deeply transversely depressed above the mouth, eyes slightly emarginate. *Prothorax* subglobose, broader than long, the sides rounded from the base to the apex, anterior edge with four prominent recurved teeth, the outer ones being shorter than the others, anteriorly sparsely covered with strong recurved teeth as far as the node, which extends nearly to the rugose base, the whole surface covered with scale and hairs, the basal margin prominent. *Scutellum* small, triangular, and rugose. *Elytra* of the same breadth and three-fourths as long again as the prothorax; striæ with uniserial, piliferous, shallow punctures; the interstices slightly convex, with uniserial, broad, short scales down the centre; the surface rugose and closely covered with very small scales.

*Length* 2·1 mm.; *breadth* 1 mm.

PORTUGUESE EAST AFRICA: Xinavane (C. B. Hardenberg).

*Type* in the British Museum.

This species closely resembles the description of *C. balanopselaphus*, Eggers, but differs in the elytral sculpture, the shape of the prothorax, etc.

X.—On some interesting *Hedgehogs* from the Persian Gulf.  
By OLDFIELD THOMAS.

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AMONG some mammals obtained for the Cox-Cheesman collection by Mr. V. S. Le Personne, and referred to me for determination, are four hedgehogs—three white and one black—from the little island of Tanb, in the north of the Persian Gulf. Remarkable to say, these hedgehogs, in spite of the small size of the island, belong to two different species, each representative of a different group of the genus *Paraechinus*. This genus tends to divide into two—the species with long pterygoid region, comparatively small bullæ, and little swollen pterygoids, and those with short pterygoid region, large bullæ, and much swollen pterygoids,—the two groups being sufficiently distinct for their respective members to be able to live in company with one another. But it is impossible to divide them as subgenera, for certain species are so absolutely intermediate that one cannot say to which group they belong—notably *P. micropus*, the genotype of *Paraechinus*. From *P. micropus* one is led by imperceptible steps, in the one direction, through *amur* and *blanfordi*, into the "*Macroechinus*" forms, and in the other into the most marked large-bullæ species.

Of the species with small bullæ, the black Tanb hedgehog seems referable to the South and East Arabian *P. niger*, but is separable as a small island subspecies of it :—

*Paraechinus niger seniculus*, subsp. n.

General characters of true *niger*, but size rather smaller, although the feet are nearly as long. Head not black as in *niger*, but nearly wholly grizzled non-grey, black and whitish hairs being uniformly mixed all over it, neither colour forming any special pattern or markings. Chin whitish, the rest of the under surface black. Ears large, thin substance blackish, their hairs white.

Skull as in *niger*, but smaller, with smaller teeth and decidedly smaller bullæ. *P*<sup>3</sup> present, well developed, though crowded, triangular.

Dimensions :—

Head and body 192 mm.; tail 18; hind foot 34; ear 41.

Skull : condylo-basal length 45·7; zygomatic breadth 26;



palatal length 25·3 ; dental length 23·5 ; combined length of  $p^4$  and two anterior molars 10.

*Hab.* as above.

*Type.* Adult male. B.M. no. 21.12.3.2. Original number 1173. Collected 5th April, 1921, by V. S. La Perouse for the "Cox-Cheesman collection" (*i. e.*, the collection of H. E. Sir Percy Cox and Major R. E. Cheesman, R.E.). Presented to the National Museum.

It may be noted that although, when describing *P. niger*, Blanford stated that the description was "chiefly taken" from the specimen he had in spirit, he did not formally select that specimen as a type. I therefore venture to do so for him, taking the specimen he referred to—B.M. no. 88.6.18.3—as the lectotype ; and at the same time I may select B.M. no. 74.11.21.25 as a lectotype of his *Erinaceus macracanthus*.

In working out this Tanb hedgehog, I have re-examined a black hedgehog from the S.W. corner of Arabia collected in 1902 by Mr. G. W. Bury in the mountainous country behind Aden.

This also proves to be subspecifically separable from true *niger*, and may be called

*Paraechinus niger sabæus*, subsp. n.

Size of type about as in small specimens of *niger*. General colour as in that animal, but the face largely mixed with whitish, the black and white hairs (on the single specimen) so arranged as to form a sort of pattern. Centre of face mostly blackish, then an area above each eye to the crown whitish, and then outside these two areas a black line on each side running up in front of the ear to the base of the anterior spines. Whether this pattern is usually present cannot at present be stated. Ears whitish. Chin and interramia white. Rest of underside, hands, and feet wholly black. Spines ringed black and white as in *niger*. Feet conspicuously smaller than in *niger*, the fore feet only 23 mm. in length, and the hinder equally small in proportion.

Skull quite as in *niger*.

Dimensions (measured in the flesh):—

Head and body 174 mm. ; tail 28 ; hind foot 30 ; ear 44.

Skull: condylo-basal length 48·5 ; zygomatic breadth 26 ; palatal length 27 ; dental length 23·3 ; combined length of  $p^3$  and first two molars 11·2.

*Hab.* Mountains north of Aden; type from El Kubar, about 60 miles north of Aden. Alt. 5200'.

*Type.* Adult male. B.M. no. 2. 11. 22. 2. Original number 11. Collected 19th June, 1902, by G. W. Bury.

Whether the facial pattern of this specimen is constant or not, the small size of its feet and its whitish head separate it from true *niger*, while the size of its skull distinguishes it from *P. n. seniculus*, which also has a somewhat similar general coloration.

The white Tanb hedgehog, the representative of the large-bulla group of *Paraechinus*, is also a new subspecies of an Arabian form. It may be called

*Paraechinus dorsalis albatius*, subsp. n.

Nearly allied, in all essential characters, to true *P. dorsalis* of the Hadramaut, but smaller and more completely white. Back at first sight appearing wholly pale sandy, but closer examination shows that the spines of the median dorsal area, where in *dorsalis* they are obviously darkened, are here also not completely white throughout their length, having a sub-terminal brown band. Spines of sides mostly light throughout. Muzzle and cheeks brown, with a median brown line running up the forehead in some specimens. Rest of head, ears, shoulders, and under surface pure white—the inguinal region, however, brownish. Hands, feet, and tail also pale brown.

Skull as in true *dorsalis*, but rather smaller. Zygomata comparatively slender. Bullæ of similarly large size, and the pterygoids well inflated. Penultimate premolar absent in all three skulls, this tooth being minute in some specimens of *dorsalis* and absent in others.

Dimensions of the type (measured in the flesh):—

Head and body 196 mm.; tail 24; hind foot 32; ear 44.

Skull: condylo-basal length 46; zygomatic breadth 27.7; palatal length 24.6; dental length 22.2; length of bulla 10; combined length of  $p^4$  and two anterior molars 11. An old male skull measures 48 mm. in condylo-basal length.

*Hab.* Tanb Island, mouth of Persian Gulf.

*Type.* Adult female. B.M. no. 21. 12. 3. 1. Original number 1185. Collected 8th April, 1921, by V. S. La Peronne for the Cox-Cheesman collection. Presented.

Readily distinguishable from *dorsalis* by its far paler colour. Also related to *P. ludlowi*, which may prove to be best placed as a third subspecies of *dorsalis*.

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XI. — *New or little-known Tipulidæ (Diptera)*. — VIII.  
*Australasian Species*. By CHARLES P. ALEXANDER, Ph.D.,  
F.E.S., Urbana, Illinois, U.S.A.

THE material upon which the present paper is based is largely from New Zealand, and is supplementary to the recent monographic treatment of the New Zealand Tipuloidea by Mr. Edwards. The extensive collections used in the preparation of the present instalment and others in press were received from several collectors, to whom my deepest thanks are due. These gentlemen are as follows: Dr. Tillyard and Mr. Philpott of the Cawthron Institute; Mr. David Miller; Dr. Campbell, who sent extensive lots of material collected by Gourlay, Harris, and himself; highly interesting collections from the alpine zones of certain mountains in the North Island, sent by Mr. Watt. In addition to the New Zealand crane-flies, a few Australian species are included, based on some interesting collections kindly sent to me for study by Mr. Edwards. Unless stated to the contrary, the holotypes are preserved in the writer's collection.

*Molophilus philpotti*, sp. n.

General coloration light yellow, including the wings; abdominal tergites bicolorous, the basal portion of each segment infuscated.

*Ann. & Mag. N. Hist.* Ser. 9. Vol. ix. 10

*Female*.—Length 4.2–4.5 mm.; wing 4.7–5 mm.

Rostrum and palpi obscure yellow. Basal segments of antennæ yellow; flagellum broken. Head light yellow.

Mesonotum shiny pale reddish yellow, the pronotum and lateral margins of the praescutum more nearly whitish. Pleura yellow. Halteres yellow. Legs yellow, the terminal tarsal segments dark brown. Wings with a strong yellowish tinge; veins yellow, the macrotrichiae pale brown. Venation: base of vein  $R_{2+3}$  atrophied or very indistinct, unprovided with macrotrichiae; anal veins convergent.

Abdominal tergites bicolorous, the basal two-thirds of each segment brown, the caudal third yellow; sternites uniformly yellow.

*Hab.* New Zealand (South Island).

*Holotype*, ♀, Nelson, December 9, 1920 (*A. Philpott*).

*Paratype*, ♀, Dum Mt., Nelson, altitude 2000 ft., December 14, 1920 (*A. Philpott*).

Type in the collection of the Cawthron Institute.

*Molophilus philpotti* is dedicated to the collector, Mr. A. Philpott, to whom I am indebted for many kindnesses in the past. This species and the next bear a resemblance to the Nearctic *M. pubipennis* (Osten-Sacken).

*Molophilus parvulus*, sp. n.

Size small (wing, ♀, under 4 mm.); general coloration pale yellowish brown; wings yellowish grey; anal veins divergent.

*Female*.—Length 3.8–4 mm.; wing 3.8 mm.

Described from alcoholic specimens.

Rostrum and palpi light brown. Antennæ with the enlarged scapal segments yellowish; flagellum pale brown. Head yellowish brown.

Thorax, including the pleura, pale yellowish brown without markings. Halteres large, pale yellow. Legs yellow, the tips of the femora and tibiae scarcely darkened; terminal tarsal segments infuscated. Wings with a yellowish-grey tinge; veins pale. Venation: origin of  $R_{2+3}$  distinct, longer than  $r$ ; deflection of  $R_5$  and  $r-m$  subequal; basal deflection of  $Cu_1$  ( $m-cu$  of Tillyard) arcuated, nearly three times as long as the basal deflection of  $M_3$ ; anal veins divergent.

Abdomen pale yellowish brown.

*Hab.* New Zealand (North Island).

*Holotype*, ♀, Olakune, altitude 2018 feet, November 10, 1920 (*T. R. Harris*); in alcohol.

*Paratopotypes*, 6 alcoholic ♀ ♀.

*Molophilus cruciferus*, sp. n.

General coloration light yellow; a blackish longitudinal stripe on the thoracic and abdominal pleura; wings light yellow with a cruciform brown mark that extends the length of the organ, the cross-arm lying along the cord.

*Female*.—Length about 1 mm.; wing 1.2 mm.

Rostrum and palpi dark brown. Antennæ with the basal segments dark brown; flagellar segments a little paler. Head obscure brownish yellow, the anterior part of the vertex darkened; a patch of erect, black, flattened hairs on the posterior part of the vertex.

Mesonotum shiny yellow, the præscutum with a pale brown median line that crosses the suture on to the scutum and scutellum. Pleura largely destroyed by the large pin, yellow, apparently with a blackish longitudinal stripe. Halteres yellow. Legs with the coxæ and trochanters yellow; femora yellow; all but the bases of the fore femora dark brown and provided with conspicuous long blackish hairs; tibiæ yellow, the fore tibiæ obscure yellow with the bases and tips conspicuously dark brown; tarsi dark brown. Wings light yellow with a very conspicuous cruciform infuscation, the long arm of which extends from the wing-root in the anal and cubital cells along veins *Cu* and *M* to the wing-apex; at the level of the cord a narrower dark mark extends from *r*, crossing the longitudinal arm and following along vein *Cu*<sub>2</sub> almost to the posterior margin; the membrane in the infuscated areas is slightly darkened, but the chief cause of the dusky appearance is the dark brown macrotrichiæ and the dark veins; veins and macrotrichiæ elsewhere on the wing light yellow. Venation: vein 2nd *A* very long, bent toward 1st *A*, but diverging slightly at the tip.

Abdomen obscure yellow with golden-yellow hairs; a series of linear dark brown marks along the pleural region, this being a continuation caudad of the thoracic pleural stripe, the line being narrowly interrupted at the base of each abdominal segment.

*Hab.* New Zealand (North Island).

*Holotype*, ♀, Te Wairoa, Hot Springs Region, November 15, 1919 (*D. Miller*).

Type in the collection of David Miller.

*Molophilus cruciferus* is an easily recognized fly that is allied to *M. pulcherrimus*, Edwards, but very distinct.

*Trimicra confluens*, sp. n.

General coloration yellow; mesonotal præscutum with

confluent brown stripes; wings with a faint greyish-brown tinge, unmarked except for the pale brown stigma; cell 1st  $M_2$  confluent with cell  $M_3$ .

*Male*.—Length 7–7.1 mm.; wing 7–9.2 mm.

*Female*.—Length 5.5 mm.; wing 6.5 mm.

Rostrum obscure yellow; palpi dark brown. Antennæ brownish black. Head grey.

Pronotum yellowish, dark brown medially. Mesonotal præscutum yellow, the disk practically covered by three confluent dark brown stripes; tuberculate pits large, separated by a distance a little less than the diameter of one; scutum with the lobes brown, yellowish posteriorly; scutellum obscure yellow; postnotum dark brown on the posterior two-thirds, obscure yellow on the basal third. Pleura yellow, indistinctly marked with darker. Halteres brown, the base of the stem and tips of the knobs yellow. Legs with the coxæ and trochanters obscure yellow; remainder of the legs obscure yellow, the terminal tarsal segments infuscated; legs with conspicuous erect setæ. Wings with faint greyish-brown tinge; stigma pale brown; veins brown. Venation:  $Sc_1$  ending opposite the end of  $r$ ,  $Sc_2$  only a little distance beyond the origin of  $Rs$ ;  $Rs$  straight;  $r$  on  $R_2$  about one-half or less its length beyond the fork; cell 1st  $M_2$  open by the atrophy of the outer deflection of  $M_3$ , so cells 1st  $M_2$  and  $M_3$  are confluent; basal deflection of  $Cu_1$  at the fork of  $M$ ; vein 2nd  $A$  straight, a little sinuous at the outer end.

Abdomen dark brown; genital segment paler, especially in the female. Male hypopygium large and powerful, especially the pleurites; outer pleural appendage terminating in a powerful black spine; inner pleural appendage with the apex obtuse, slightly dilated; gonapophyses appearing as long, slender, gently curved horns.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Christchurch, October 10, 1917 (*J. W. Campbell*); mounted in balsam.

*Allotype*, ♀, Blackball, West Coast, March 1920 (*J. W. Campbell*).

*Paratopotype*, ♂; mounted in balsam.

The beautiful slides of this species and other Tipulidæ in my collection were prepared by Dr. Campbell, to whom I am greatly indebted for many favours.

*Trimicra inconstans*, sp. n.

General coloration yellow with brown markings; præscutum with brownish-grey stripes, the interspaces and a

capillary median line dark brown; wings subhyaline, conspicuously spotted with brown; cell 1st  $M_2$  closed or open, the venation in this region inconstant.

*Male*.—Length 7–7.5 mm.; wing 8.8–10 mm.

*Female*.—Length about 5 mm.; wing about 6 mm.

Rostrum obscure yellow; palpi dark brown. Antennæ brownish black. Head grey.

Mesonotal præscutum buffy yellow with three brownish-grey stripes, the interspaces and a capillary median line dark brown; scutal lobes brown; scutellum yellow, the base darker; postnotum grey. Pleura greyish with a short yellowish longitudinal stripe ending immediately before the halteres; dorso-pleural area obscure yellow. Halteres pale, the knobs slightly darker. Legs with the coxæ and trochanters obscure yellow; remainder of the legs obscure yellow, the terminal tarsal segments infuscated. Wings subhyaline, conspicuously spotted with brown as follows:—Origin of  $R_s$ ; at  $Sc_2$ ; along the cord and outer end of cell 1st  $M_2$ ; small but distinct clouds at the ends of the longitudinal veins; veins dark brown. Venation:  $Sc_1$  ending opposite the fork of  $R_{2+3}$ ,  $Sc_2$  a short distance beyond the origin of  $R_s$ ;  $r$  on  $R_2$  a short distance beyond its origin; cell 1st  $M_2$  closed or open; when closed,  $m$  is short, transverse, the outer deflection of  $M_3$  in one wing of the paratype elongated and rectangularly bent near mid-length; in the holotype, the right wing has cell 1st  $M_2$  confluent with cell 2nd  $M_2$  by the atrophy of  $m$ , the left wing has both  $m$  and the deflection of  $M_3$  atrophied so that the distal section of  $M_3$  lies free in the membrane as in certain Blepharoceridæ: these unstable conditions indicate an inconstant venation for the species; basal deflection of  $Cu_1$  oblique, some distance before the fork of  $M$ .

Abdomen dark brown, the lateral margins of the segments broadly, the caudal margins more narrowly, yellowish; hypopygium brownish yellow. Male hypopygium somewhat as in *T. confluent*, but the gonapophyses are shorter and more strongly curved.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Spreydon, Canterbury, December 1920 (*J. W. Campbell*).

*Allotype*, alcoholic ♀, Riccarton Bush, Christchurch, Canterbury, 1921 (*E. S. Gourlay*).

*Paratype*, ♂, Old Man Range, Central Otago, January 1920 (*Geo. Howes*).

*Gnophomyia flavopygialis*, sp. n.

Size small (wing under 8 mm.); general coloration reddish brown, the praescutum and scutum marked with darker brown; femora and tibiae yellow, tipped with dark brown; wings faintly yellowish, stigma small, dark brown; mostly lying distad of  $r$ ; hypopygium yellowish; pleural appendages tapering to a single apical spine.

*Male*.—Length 4.5–5.5 mm.; wing 6.3–7.8 mm.

*Female*.—Length 5.5–5.8 mm.; wing 5.9–7 mm.

Rostrum reddish; palpi dark brown. Antennae dark brown, the basal segments a little more reddish; flagellar segments oval-cylindrical. Head grey.

Mesonotum light reddish brown. The praescutum with three darker brown stripes; median stripe broad, becoming obliterated before the suture, very indistinctly split by a capillary darker line; lateral stripes less distinct, better delimited internally; scutal lobes dark brown; scutellum dark brown; postnotum reddish anteriorly, passing into brown behind. Pleura reddish brown; an interrupted dorsal brown longitudinal stripe extending to the halteres; mesosternum dark medially and as a narrow line cephalad of the mesocoxa. Halteres yellow. Legs with the coxae and trochanters reddish brown; femora and tibiae obscure yellow, the tips narrowly dark brown; tarsi dark brown. Wings with a faint yellow tinge, the costal cell faintly infuscated, especially basally; stigma small, dark brown, almost all lying distad of  $r$ ; veins dark brown. Venation:  $Sc_2$  at the extreme tip of  $Sc_1$ , so  $Sc_2$  alone is about equal to  $r-m$ ;  $r$  just before the fork of  $M$ .

Abdomen dark brown; hypopygium reddish yellow, this coloration including the pleurites and appendages. Male hypopygium with the pleurites stout, tapering to the apex; the single pleural appendage is situated at the apex of the pleurite, slender, tapering to the single acute apical spine; before the tip on the cephalic face with a small weakly setigerous lobule; no brush of setae at base of caudal-lateral angle of appendage.

The paratypes are smaller than the type with  $Sc_1$  a little longer and the stigmal spot fainter, but the coloration and structure of the male hypopygium is quite the same.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Blackball, West Coast, March 1920 (*J. W. Campbell*).

*Allotype*, ♀, Nelson, January 1, 1920 (*A. Philpott*).



*Paratopotype*, 1 ♂; *paratypes*, 2 ♂♂, Nelson; 2 ♂♂, 1 ♀, Takaka, Nelson, February 6, 1920 (*P. J. Thyrid*).

The allotype and certain paratypes in the collection of the Canadian Museum.

*G. glaucopis* is allied to *G. neozelandica*, Edwards. In his splendid revision of the Tipuloidea of New Zealand, Mr. Edwards has proposed a new subgeneric term for this latter species. Since this was written, the remarkable aquatic larva and pupa of the flies of this genus have been discovered by Dr. Campbell and Dr. Thynell, and there can be no doubt but that Edwards's group deserves full generic ranking.

*Atarba (Atarba) filicornis*, sp. n.

Antennæ of male only a little shorter than the entire body; cell 1st  $M_2$  small; male hypopygium with an erect chitinized spike near the base of each pleural appendage, the latter bifid with one arm appearing as a slender chitinized spine.

*Male*.—Length 6 mm.; wing 6.3 mm.; antenna 5.4 mm.

*Female*.—Length 6.2 mm.; wing 6.5 mm.

Rostrum and palpi dark brown. Antennæ of the male very long, only a little shorter than the body, dark brown; basal segments a little more testaceous; flagellar segments elongate-cylindrical, provided with abundant erect hairs. In the female the flagellar segments are distinctly bicolorous, the basal half of each flagellar segment brown, the distal half distinctly pale. Head reddish brown, the vertex with a golden-yellow pollen.

Mesonotum shiny obscure yellow without darker markings. Pleura yellow, the dorsal pleurites a little darkened. Halteres brown, the knobs dark brown. Legs obscure yellow, only the terminal tarsal segments dark brown; tibial spurs present. Wings with a strong yellowish-grey suffusion, highly iridescent; cells *C* and *Sc* more yellowish; stigma pale yellowish brown; veins brown. Venation: *Sc* short,  $Sc_1$  ending about opposite one-fourth the length of *Rs*,  $Sc_2$  immediately before the origin of *Rs*; *Rs* comparatively short and rather strongly arcuated at origin; veins  $R_{2+3}$  and  $R_{4+5}$  parallel for almost their entire length; cell 1st  $M_2$  small, nearly square; basal deflection of  $Cu_1$  at the fork of *M*.

Abdomen obscure yellowish brown; in the male a brownish-black subterminal ring; hypopygium obscure yellow.

Male hypopygium with the blackened pleural appendage with a conspicuous black spike at base, the tip with small black spinulæ; each pleural appendage terminates in an elongate, slender, gently curved spine, immediately below which is a pale cylindrical lobe terminating in a seta; this seems to be a single complex appendage rather than two approximated appendages, but this cannot be definitely affirmed without treating the hypopygium.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dun Mt., Nelson, altitude 2500 ft., January 27, 1921 (*A. Philpott*).

*Allotopotype*, ♀, altitude 3000 ft., January 24, 1921.

Type in the collection of the Cawthron Institute.

*Limnophila watti*, sp. n.

General coloration dark brown, the pleura grey pruinose; halteres yellow; legs yellow, the terminal tarsal segments brownish black; wings greyish yellow, the base and costal region clearer yellow; *r* far from tip of  $R_1$ ; cell  $M_1$  present, a little shorter than its petiole.

*Female*.—Length about 6.5 mm.; wing 7 mm.

Rostrum, palpi, and antennæ brown. Head with a greyish-yellow pollen.

Pronotum dark brown with a greyish-yellow pollen. Mesonotal præscutum shiny dark brown, the interspaces and lateral margins more pollinose; humeral region obscure brownish yellow; pseudosutural foveæ conspicuous, black; tuberculate pits elongate, lying a little before the level of the pseudosutural foveæ; remainder of mesonotum heavily pruinose, the scutellum more testaceous. Pleura dark with a delicate grey appressed pubescence, the dorsal sclerites more infuscated. Halteres yellow. Legs with the coxæ brown, covered with microscopic hairs; trochanters brown; femora and tibiæ obscure yellow, the tibial tips narrowly darkened; metatarsi brownish yellow, the tips narrowly darkened; terminal tarsal segments brownish black. Wings with a greyish-yellow tinge, clearer yellow at the base of wing and in cells *C*, *Sc*, and behind vein *Cu*; stigma pale brown; veins brown. Venation:  $Sc_1$  ending opposite the end of  $Rs$ ,  $Sc_2$  slightly removed from the tip of  $Sc_1$ , the latter alone a little longer than  $R_{2+3}$ ;  $Rs$  long, arcuated at origin;  $R_{2+3}$  shorter than the deflection of  $R_{4+5}$ ;  $R_2$  strongly arcuated at origin; *r* faint, far from the tip of  $R_1$ , near mid-distance between fork of  $R_{2+3}$  and tip of  $R_1$ ; inner

ends of cells  $R_3$ ,  $R_5$ , and 1st  $M_2$  about in alignment; cell 1st  $M_2$  small, pentagonal; cell  $M_1$  only a little shorter than its petiole; basal deflection of  $Cu_1$  rather close to the fork of  $M$ , at about one-sixth the length of cell 1st  $M_2$ .

Abdomen dark brown. Ovipositor dark horn-colour, elongate-acicular.

*Hab.* New Zealand (North Island).

*Holotype*, ♀, Mt. Ruapehu, alpine zone, altitude 4000–5000 ft., January 1921 (*M. N. Watt*).

“Collected in thick bush.”

*Limnophila watti* is named in honour of the collector, Mr. Morris N. Watt, to whom the writer is indebted for many fine crane-flies from the alpine zones of Mts. Egmont and Ruapehu.

*Limnophila ruapehuensis*, sp. n.

General coloration yellow; mesonotal præscutum with indistinct darker stripes; head yellow; legs yellow, only the terminal tarsal segments darkened; wings light yellow,  $r$  very indistinct, far from the tip of  $R_1$ ; cell  $M_1$  small, only about one-half the length of its petiole.

*Female*.—Length 6 mm.; wing 6.2–6.3 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the basal segment paler. Head with a brownish-yellow pollen.

Mesonotum with a brownish-yellow pollen, the præscutum with three very faint darker stripes, the humeral region yellowish; tuberculate pits as in *L. watti*, elongate, situated far caudad and lying close together. Pleura yellow, the dorsal pleurites marked with brown. Halteres yellow. Legs with the coxæ and trochanters yellow; remainder of the legs yellow, the terminal tarsal segments infuscated. Wings light yellow; veins brownish yellow. Venation:  $Sc_1$  about twice the length of  $Sc_2$ ;  $R_{2+3}$  shorter than the deflection of  $R_{4+5}$ ;  $r$  very indistinct, far removed from the tip of  $R_1$ ; cell  $M_1$  small, about one-half the length of its petiole; basal deflection of  $Cu_1$  at about one-fifth the length of cell 1st  $M_2$ .

Abdominal segments distinctly annulated, the basal two-fifths or less of each segment dark brown, the distal three-fifths or more yellowish. Ovipositor elongate, yellowish horn-colour.

*Hab.* New Zealand (North Island).

*Holotype*, ♀, Mt. Ruapehu, alpine zone, altitude 4000–5000 ft., January 1921 (*M. N. Watt*).

*Paratopotypes*, 3 ♂ ♀.

"Collected in thick bush."

*Limnophila ruapehuensis* and *L. watti* appear to be related to the Nearctic *L. brevifera*, Osten-Sacken.

*Gynoplistia dimidiata*, sp. n.

General coloration shiny coal-black; antennæ with fifteen segments; flagellar segments 1 to 9 with long flabellations, the longest about one-half as long as the flagellum; fore tibia black throughout; posterior tibia with an obscure whitish ring; wings indistinctly dimidiate, the cells beyond the cord conspicuously darker than cells *R* and *M*; base of cell *R* clear; *r* present.

*Male*.—Length 5.2 mm.; wing 5.8 mm.

Rostrum and palpi black. Antennæ black throughout; 13 flagellar segments, segments 1 to 9 with long flabellations, the longest (on segments 3 and 4) approximately one-half the length of the entire flagellum; terminal four segments simple. Head shiny coal-black.

Pronotum and mesonotum shiny coal-black. Pleura coal-black without pruinosity. Halteres pale, the knobs dark brown. Legs with the coxæ brown, paler apically; trochanters obscure yellow; fore femora obscure yellow on basal three-fifths, the dilated apex black, fore tibia and tarsi black; hind legs similar, but the posterior tibiæ with an obscure whitish wing near mid-length that is about as wide as the dark apex beyond it; pubescence of legs not conspicuous; middle legs lacking. Wings with the area basad of the cord greyish subhyaline, beyond the cord conspicuously infuscated to give the wing a dimidiate appearance; cell *Sc* darker than cell *C*; stigmal area large, brown, continued caudad as a seam along the cord; a narrow brown seam at origin of *Rs*; a faint brown clouding near the bases of cells *M* and *Cu* and including the outer ends of cells *Cu*, 1st *A*, and 2nd *A*; base of cell *R* entirely clear; veins dark brownish black. Venation: *Sc* short, ending just beyond mid-length of the short, strongly arcuated sector; *Sc*<sub>2</sub> at the tip of *Sc*<sub>1</sub>; *R*<sub>2+3</sub> very short, about equal to *r*; *r* faint but evident, near mid-distance between the fork of *R*<sub>2+3</sub> and the tip of *R*<sub>1</sub>; deflection of *R*<sub>4+5</sub> elongate, without macrotrichiae; cell *M*<sub>1</sub> about one-half longer than its petiole; basal deflection of *Cu*<sub>1</sub> near one-third the length of cell 1st *M*<sub>2</sub>.

Abdomen shiny coal-black, the pleural appendages of the hypopygium obscure yellow.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dun Mt., Nelson, altitude 2000 ft., January 29, 1921 (A. P. Ippolt).

Type in the collection of the Cawthron Institute.

*Gynophlistia campbelli*, sp. n.

General coloration shiny black with conspicuous metallic-blue reflexions; antennæ with fifteen segments; flagellar segments one to eight with long flabellations; terminal five segments simple; wings subhyaline with an extensive but indistinct cross-banded pale brown pattern, in addition to larger and darker marks at the origin of *Rs* and the stigma; cell *M*<sub>1</sub> lacking.

*Male*.—Length 6.7 mm.; wing 6.4 mm.

Rostrum and palpi black. Antennæ black, 15-segmented; flagellar segments 1 to 8 with long flabellations; terminal five segments simple; longest flabellations about two-fifths the length of the flagellum. Head shiny black, with faint bluish reflexions.

Mesonotum shiny black with faint bluish reflexions. Pleura concolorous with the mesonotum with a narrow line of appressed grey pubescence extending from the fore coxa almost to the wing-root. Halteres broken. Legs with the coxæ shiny black; trochanters dark brown; remainder of the legs black, the femoral bases broadly paler. Wings subhyaline with an extensive pale brown pattern; a large darker brown area at the origin of *Rs*, not reaching vein *M*; stigmal area large, dark brown, continued caudad along the cord to cell 1st *M*<sub>2</sub>; the wing-tip, a band in the cubital cell opposite the level of the cord, a band in cells *M*, *Cu*, and 1st *A* opposite to the origin of *Rs*, and cell 2nd *A*, with the exception of the base, paler brown; veins dark brown. Venation: *Sc*<sub>2</sub> ending just before the end of *Rs*, *Sc*<sub>1</sub> indistinct; *Rs* long, angulated at origin; *R*<sub>2+3</sub> short, about equal to *r*; *r* beyond mid-length of the distance between origin of *R*<sub>2</sub> and the tip of *R*<sub>1</sub>; cell *M*<sub>1</sub> lacking; basal deflection of *Cu*<sub>1</sub> at one-fourth the length of cell 1st *M*<sub>2</sub>.

Abdomen black with conspicuous metallic-blue reflexions; hypopygium small, obscure chestnut-brown.

*Hab.* New Zealand.

*Holotype*, ♂, exact locality unknown, but probably Blackball, South Island (J. W. Campbell).

*Gynophlistia campbelli* is dedicated to my friend, Dr. J. W. Campbell, to whom I am indebted for many specimens of

New Zealand Tipulidæ, as well as valuable notes and observations. It is the only New Zealand species with cell  $M_1$  lacking, a character possessed only by *G. jucunda*, Osten-Sacken, and *G. octofasciata*, Brunetti (Celebes), among the described species of the genus.

*Gynoplistia fulviventris*, sp. n.

Related to *G. bimaculata*, Skuse; size smaller (wing, ♂, 7.2 mm.); mesonotum heavily pollinose; halteres orange throughout; wings uniformly tinged with brown; conspicuous darker brown spots at origin of  $R_s$  and at the deflection of  $R_{4+5}$ ; male hypopygium with a single pleural appendage, the tip of which is strongly curved.

*Male*.—Length 7.5 mm.; wing 7.2 mm.

Rostrum and palpi dark brown. Antennæ injured in the type, apparently with twelve branched flageller segments, dark brown throughout. Head dark brown with a sparse yellow pollen.

Mesonotum and pleura with a very heavy yellow pollen, which nearly conceals the brown or black ground-colour; pseudosutural foveæ large, conspicuous, broadly triangular in outline, the surface microscopically punctulate. Halteres orange throughout. Legs with the coxæ dark, yellowish-grey pruinose; trochanters dark brown; femora and tibiæ yellow, the tips of each rather narrowly dark brown; metatarsi brown, the tips dark brown; remainder of tarsi dark brown. Wings with a strong brown tinge; stigma darker brown, this colour continued along the cord as a conspicuous seam at the deflection of  $R_{4+5}$ ; a smaller but conspicuous spot at origin of  $R_s$ ; veins brown. Venation:  $R_s$  strongly arcuated at origin;  $R_{2+3}$  short, about equal to  $m$ ;  $r-m$  shorter than  $m$ ; petiole of cell  $M_1$  shorter than the cell; basal deflection of  $Cu_1$  just before mid-length of cell 1st  $M_2$ .

Abdomen fulvous, a little darker toward the apex of the organ; basal tergite infuscated, but not blackened. Male hypopygium with each pleurite slender, tapering gradually to the narrow apex, the outer face clothed with conspicuous reddish setæ; a single pleural appendage, narrow basally, dilated before mid-length, thence narrowed to the acute, strongly curved point; on the cephalic or proximal margin are two protuberances, one opposite the subbasal dilation, the second appearing as a small triangular wing some distance before the tip. Gonapophyses complex, each bearing two laterally-directed curved hooks, the more caudal of which is very slender and delicate.

*Hab.* Tasmania.

*Holotype*, ♂, Mangalore, January 25, 1913 (*A. White*).

Type in the collection of the British Museum (Natural History) from the White collection, No. 1917. 104.

*Gynoplistia simplex*, sp. n.

General coloration shiny coal-black without blue or metallic reflexions; thoracic pleura and coxæ silvery pruinose; antenna of male with eleven pectinate segments; male hypopygium with a single pleural appendage that is curved, the apex subacute.

*Male*.—Length about 10 mm.; wing 9.5 mm.

Rostrum and palpi brownish black. Antennæ with eleven pectinate flagellar segments; tip of antenna broken, there being a total of fifteen segments present; basal two flagellar segments with long pectinations; flagellar segments 3 to 11 pectinate, the pectination of the last segment longer than the two simple segments following; antenna black throughout. Head shiny coal-black.

Mesonotum shiny black. Pleura heavily silvery pruinose. Halteres dark brown. Legs with the coxæ pruinose; trochanters black; remainder of the legs broken. Wings subhyaline, the apex clouded with brown, this including the outer ends of cells  $R_2$ ,  $R_3$ ,  $R_5$ , 2nd  $M_2$ , and most of  $M_1$ ; conspicuous dark brown spots at stigma, extending along the cord to  $r-m$ ; a large spot at origin of  $R_s$  and a less distinct area in the base of cell  $R$ ; remaining veins of the cord indistinctly seamed with brown; cells  $C$  and  $Sc$  brown, the latter darker. Venation:  $Sc_1$  ending near mid-length of  $R_{2+3}$ ;  $R_{2+3}$  and deflection of  $R_{4+5}$  subequal or the former shorter; cell  $M_1$  present; basal deflection of  $Cu_1$  before or at mid-length of cell 1st  $M_2$ .

Abdomen entirely coal-black, including the hypopygium. Male hypopygium with a single pleural appendage, this broadest basally, thence gently curved and narrowed to the subacute apex.

*Hab.* Tasmania.

*Holotype*, ♂, Mangalore, October 19, 1911 (*A. White*).

Type in the collection of the British Museum (Natural History), from the White collection, No. 1917. 104.

*Cerozodia victoria*, sp. n.

General coloration dark brown, the head and thorax pruinose; mesonotal præscutum with three black stripes;

legs dark brown; wings subhyaline, heavily cross-banded with dark brown.

*Male*.—Length about 13.5 mm.; wing 12.2 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the scapal segments slightly pruinose; only nine flagellar segments are present in the unique type, these all branched and with the branches in the same plane; the terminal pectinations are shortened and the total number of antennal segments is presumably not more than sixteen or eighteen. Head dark, sparsely pruinose, clearer grey adjoining the inner margin of the eyes.

Mesonotum clear grey, the præscutum with three black stripes; pseudosutural foveæ conspicuous, triangular, black. Pleura dark, sparsely pruinose. Halteres dark brown. Legs with the coxæ black, sparsely pruinose; remainder of the legs dark brown, including the tarsi. Wings subhyaline, very heavily spotted and cross-banded with dark brown; cells *C* and *Sc* dark brown; arcular cell dark; a spot in cell *R* mid-distant between arculus and origin of *Rs*; a large quadrate area at origin of *Rs*; a very broad cross-band at the cord, including the stigma, continued caudad along the cord and outer end of cell 1st *M*<sub>2</sub> to the caudal margin of the wing in cell *Cu*<sub>1</sub>, the centre of cell 1st *M*<sub>2</sub> subhyaline; the terminal dark band occupies the wing-tip, in the extreme outer end of cell 2nd *R*<sub>1</sub>; distal two-fifths of cells *R*<sub>2</sub> and *R*<sub>3</sub>; about the distal half of cells *R*<sub>3</sub> and 2nd *M*<sub>2</sub>; all of *M*<sub>1</sub> and the extreme tip of *M*<sub>3</sub>; conspicuous brown clouds in the basal half of *Cu*, the outer quarter of cell 1st *A*, and the outer half of cell 2nd *A*; veins dark brown. Venation: *Rs* in alignment with *R*<sub>2+3</sub>; *r* near mid-distance between the fork of *R*<sub>2+3</sub> and the tip of *R*<sub>1</sub>; cell 1st *M*<sub>2</sub> rectangular; petiole of cell *M*<sub>1</sub> elongate, only a little shorter than the cell itself; basal deflection *Cu*<sub>1</sub> at one-third the length of cell 1st *M*<sub>2</sub>.

Abdominal tergites shiny brownish black, including the hypopygium; sternites slightly pruinose.

*Hab.* Victoria.

*Holotype*, ♂, collected by C. French.

Type in the collection of the British Museum (Natural History), No. 1912.491.

*Cerozodia victoria* is slightly larger than the Tasmanian *C. minuscula*, Alex.

*Clytocosmus edwardsi*, sp. n.

*Female*.—Length about 27 mm.; wing 20.5 mm.



Generally similar to *C. tilyardi*, Alex., differing principally in the structure of the antennæ and the coloration of the abdominal tergites.

First antennal segment orange, the remaining segments dark brown; flagellar segments 1 to 4 broadly pyriform, decreasing in size from the first to the fourth; segments beyond the fourth cylindrical and provided with very long verticils.

Mesonotum and pleura with orange stripes. Legs black. Wings with a strong yellowish tinge, more infuscated on the distal half, the centres of cells *M*, *Cu*<sub>1</sub>, and 1st *A* paler.

Abdominal tergites black, only the eighth and ninth segments orange. First tergite with a large, triangular, white area on each side; second tergite black, unmarked except for a large, elongate, transverse, white area on either side, only narrowly separated on the median line; tergite 3 black with a small, rounded, white spot near the lateral margin and an even smaller pair lying more cephalad and closer to the median line; tergite 4 with only the rounded lateral spots; tergite 5 with the lateral spots slightly larger, and in addition with two much larger white areas closer to the median line, these latter areas larger than the black space separating them; tergites 6 and 7 black with large and conspicuous white lateral spots; segment 8 orange; segment 9 and the ovipositor more castaneous. Sternites orange, the lateral margins narrowly but conspicuously blackened.

*Hab.* Victoria.

*Holotype*, ♀, labelled "F. N. Gully, 12.4.1909."

Type in the collection of the British Museum (Natural History) from the White Collection, No. 1917.101.

Mr. Edwards writes that Brunetti has two additional females of this species from Monbulk, Victoria.

The genus *Chytocosmus* includes the most magnificent crane-flies so far discovered. The five known species may be separated by the accompanying key:—

- |   |                               |
|---|-------------------------------|
| 1. Stripes of the mesonotal præscutum black.  | 2.                            |
| Stripes of the mesonotal præscutum orange.  | 3.                            |
| 2. Basal three flagellar segments subpyriform;<br>abdomen black, tergites 2-4 bright<br>yellow. (North Queensland.)   | ..... <i>tilyardi</i> , Ried. |
| Basal seven flagellar segments cordiform;<br>abdomen black, the basal half of tergite<br>2 orange. (New South Wales.) | ..... <i>skusei</i> , Alex.   |
| 3. Prothorax, mesonotal scutellum, and post-<br>notum black; thoracic pleura black,                                   |                               |

spotted with white. (New South Wales.)	.....	<i>helmsi</i> , Skuse; genoty pe.
Prothorax, mesonotal scutellum, and post-notum orange; thoracic pleura orange, spotted with white	.....	
4. Abdominal tergites 1 and 2 with orange markings: tergite 7 orange. (New South Wales.)	.....	<i>tillyardi</i> , Alex.
Abdominal tergites 1-7 black, spotted with white, without orange markings. (Victoria.)	.....	<i>edwardsi</i> , sp. n.

*Clytocosmus edwardsi* is dedicated to Mr. F. W. Edwards, of the British Museum of Natural History, in appreciation of the many favours he has shown the writer in his studies on the Tipulidæ.

XII.—*Notes on Myriapoda*.—XXVI. *The Names of some Iulidæ and Blaniulidæ*. By the Rev. S. GRAHAM BRADE-BIRKS, M.Sc. (Manchester), Lecturer in Zoology and Geology, S.E. Agricultural College (University of London), Wye, Kent.

It is clear from a study of two recent papers—one by Chamberlin (1921), the other by Brölemann (1921)—that we must make certain alterations of names in our faunal lists.

As a result of correspondence with both authors and a perusal of these papers, the writer is able to make the following remarks:—

*Cylindroiulus londinensis*, var. *cæruleocinctus* (Wood, 1864),  
= *C. londinensis*, var. *teutonicus* (Pocock, 1900).

The form we have known recently in this country under the name of *Cylindroiulus londinensis*, var. *teutonicus* (Pocock), also occurs in North America, where, as on the continent of Europe, it seems to have been regarded as the typical form of Leach's "*Iulus londinensis*." Chamberlin, taking the view that *Cylindroiulus*, Verhoeff, is a synonym of *Diploiulus*, Berlese, 1883, calls the animal *Diploiulus londinensis* (Leach). Some authors regard *Diploiulus* as a synonym of *Iulus*. An important point for us is that Chamberlin includes in his synonymy of this form "1864. *Iulus cæruleo-cinctus* Wood, Proc. Acad. Sci. Phil., p. 14." In litt. Chamberlin says, "Our form is the var. *teutonicus*, agreeing fully with European specimens identified as *londinensis* by Meinert and

Verhoeff. However, Wood's name *cæruleocinctus* must replace *teutonicus*, having the priority by many years." With this the writer agrees, and, until it is shown conclusively that *Cylindroiulus* is a synonym of *Diploiulus*, it would seem that for this form we must use the name *Cylindroiulus londinensis*, var. *cæruleocinctus* (Wood).

*Cylindroiulus oweni* (Bollman, 1887)  
= *C. frisius* (Verhoeff, 1891).

Chamberlin speaks of a form he calls *Diploiulus luscus* (Meinert). There is no doubt that the animal known to Chamberlin under this name is *Iulus frisius*, Verhoeff, 1891, for Chamberlin finds that "Comparison of American specimens with some from Holland shows complete agreement in the gonopods of the male." *In litt.* Chamberlin explains to me why he calls this species *luscus* (Meinert). "Probably," he says, "I have been influenced in using Meinert's name *luscus* by the fact that specimens sent me many years ago by Dr. Meinert under the name are the same species as *oweni*, etc."

In his paper Chamberlin gives the following synonymy:—

- "1868. *Iulus luscus* Meinert, Naturh. Tidsskr., 3 R., V, p. 9.
- 1887. *Iulus owenii* Bollman, Entom. Amer., ii, p. 228.
- 1891. *Iulus frisius* Verhoeff, Berl. Ent. Zeits., xxxvi, Hft. 1, p. 133, pl. 6, figs. 17-21.
- 1914. *Iulus hesperus* Chamberlin, Canad. Ent., p. 314."

He also states, "There seems little doubt that this is the true *luscus* of Meinert; but if *luscus* is held to be indeterminate with certainty, then *owenii* must take precedence over *frisius*." The writer agrees, and until further evidence is forthcoming proposes to use the name *oweni*, as it appears at the head of this section.

*Brachyiulus pusillus* (Leach, 1814).

Chamberlin says, "This species is sometimes placed by European workers in a subgenus *Microbrachyiulus*; but as it is the type of *Brachyiulus* any genus or subgenus in which it is included must bear this name." Consequently we must cease to use the subgeneric appellation in the case of this animal.

*Ophiulus pilosus* (Newport, 1842).

For this form Chamberlin uses the name *Ophiulus longabo* (C. Koch). From what has been said by Bülemann (1919),  
*Ann. & Mag. N. Hist.* Ser. 9. Vol. ix. 11

p. 67, and in two papers in this series (Brade-Birks, Mar. 1919 and 1919 b), it will be seen that the name at the head of this paragraph has priority, and that the spelling of the generic name is as there shown.

*Blaniulus guttulatus* (Bosc, 1792).

The writer is in agreement with Chamberlin in his use of this name, but *Iulus pulchellus*, Leach, 1814, is a synonym.

*Nopoiulus minutus* (Brandt, 1841) = *Nopoiulus kochi* (Gervais, 1847) = *Nopoiulus venustus* (Meinert, 1868).

Under the name *Nopoiulus pulchellus* (Leach) it is evident that Chamberlin refers to the form called *N. kochi* (Gervais) in the eighteenth paper in this series (Brade-Birks, Oct. 1919), but *Iulus pulchellus*, Leach, 1814, has been shown to be synonymous with *Iulus guttulatus*, Bosc, 1792; and, though the name *Iulus pulchellus*, C. L. Koch, 1838, has been used for the animal of which we are now speaking, that name, being preoccupied by Leach's use of it, cannot stand here. We fell back upon the name *kochi* (*Iulus kochii*, Gervais, 1847), but, accepting Chamberlin's synonymy, we must adopt an earlier name, and call the animal *Nopoiulus minutus* (Brandt) (*Iulus minutus*, Brandt, 1841, Recueil. p. 89).

#### FURTHER CONSIDERATIONS.

Brölemann (1921), giving a diagnostic key, expressly mentions the family Blaniulidæ in his title. As far back as 1847 C. L. Koch (Syst. d. Myr. p. 48) speaks of "Blaniuliden," and as this name antedates even the genus *Isobates*, Menge, 1851, the present writer feels that the name Blaniulidæ is to be preferred to Isobatidæ, which is used by Chamberlin (1921). As Chamberlin says, "The use of Protoiulidæ for this family is inadmissible both because it is antedated by the names Isobatidæ and Blaniulidæ and also because it is not based upon an included genus."

New genera are established by Brölemann (1921), and as British forms fall into three of them, a list of the species thus affected is appended:—

*Choneiulus palmatus* (Němec).

*Blaniulus palmatus*, Němec, 1895, Věstník král. české společnosti nauk. Trída math.-přirodovědecká (p. 5 of reprint).

*Archiboreoiulus pallidus* (mihl).

*Proteroiulus pallidus*, S. G. Brade-Birks, 1920, Ann. & Mag. Nat. Hist. ser. 9, vol. vi. pp. 364, 365.

*Boreoiulus tenuis* (Bigler).

*Monacobates tenuis*, Bigler, 1913, Rev. Suisse Zool. Geneva, xvi.  
p. 750.

It should be added that Brölemann places the form described by Am Stein in 1857 as *Blaniulus fuscus*, known to us recently as *Amsteinia fuscus*, in the genus *Proteroiulus*, Silvestri.

S.E. Agricultural College,  
Wye, Kent,  
16th November, 1921.

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XIII.—*On the Spiders captured by Mr. C. S. Elton at Spitsbergen and Bear Island in 1921. Results of the Oxford University Expedition to Spitsbergen.*—No. 5. By A. RANDELL JACKSON.

THE following eight species were obtained by Mr. C. S. Elton. Seven of these had been recorded previously from these regions, the eighth appears to be new to science. One of the seven seems never to have been figured, so I add illustrations to those of the new species.

The Expedition obtained specimens, in Bear Island from June 14th to June 22nd inclusive, and in Spitsbergen from June 26th to August 11th.

1. *Leptyphantes sobrius*, Thor. (1).

Both males and females in Mr. Elton's collection, as well as numbers of immature examples. *L. latebricola*, L. K. (3), which was obtained in Nova Zembla and Siberia, is possibly the same species. König (10) gave additional descriptions of the female, but the sexual organs were not figured, nor does there seem to be any figure or description of the palpus.

The paracymbium is of a very distinct shape, showing two very prominent upwardly projecting processes between the apex and base. The lamella characteristic issues from behind the paracymbium; it divides into two limbs, one above the other. The upper one consists of a slender, slightly curved, pointed, chitinous rod, from the lower side of which springs a glistening white feathery fringe, the termination of which forms a plume. The lower part is a semitransparent fragile membranous plate, ending in a dark, strongly chitinized, spine-like point. The tibia bears above six or eight bristles about as long as the diameter of the joint. There are several long hairs on the patella, which also bears on a slight eminence on the upper side near the distal end a long strong seta several times as long as the joint. The tarsus bears a blunt lobe on the outer side near the base. It is drawn out into a point behind at the inner side.

Length of articles:—patella .15 mm., tibia .15 mm., tarsus .57 mm.

The femora of the legs are all unarmed, except the first pair, each of which has a spine on its upper third on the inner side. The first and second metatarsi each show a single spine above in the upper third. The third and fourth metatarsi, in addition to this, show one at the same level beneath and one a little lower on the outer side, three in all.

Colour and markings as in the female (1) and (10).

The epigyne is fairly characteristic, but has a strong general resemblance to that of several other species of the genus.

Advent Bay, Klaas Billen, Prince Charles Foreland.

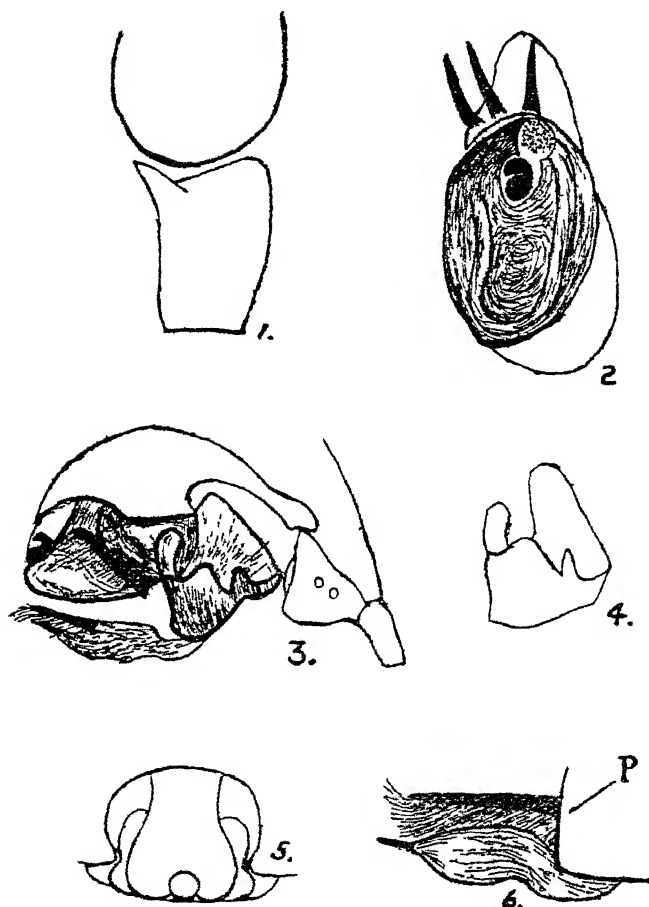
2. *Hilaira glacialis*, Thor. (1).

Four adult males and one adult female.

Sexual organs figured by Kulczynski (9).

Klaas Billen, Advent Bay.

This species occurs also in Siberia.



- Fig. 1.—*Micaria eltonii*, sp. n. Male palpus: left tibia and part of tarsus from above.
- Fig. 2.—*Micaria eltonii*, sp. n. Male palpus: palpal organs and tarsal spines of left side, from below.
- Fig. 3.—*Leptyphantes sobrius*, Thor. Left palpus of male, from outer side.
- Fig. 4.—*Leptyphantes sobrius*, Thor. Left paracymbium from outer side and slightly from behind.
- Fig. 5.—*Leptyphantes sobrius*, Thor. Epigyne of female from below.
- Fig. 6.—*Leptyphantes sobrius*, Thor. Lamella characteristica of left side from below. P denotes paracymbium.

3. *Typhochrestus spetsbergensis*, Thor. (1).

Six adult males, five adult females, and a number of immature examples.

Klaas Billen, Prince Charles Foreland, Gips Valley. Also from Siberia, New Siberian islands (9); probably Greenland.

4. *Erigone psychrophila*, Thor. (1).

Two males only at Ebba Valley.

Occurs also in Siberia and the New Siberian Islands (9) and Franz Joseph Land.

5. *Erigone arctica*, White.

Four males and two females at Klaas Billen.

Several of the immature specimens probably belong to this species.

Of a very wide range, including the British Isles, in many parts of which it is common.

6. *Erigone tirolensis*, L. K.

A female from Klaas Billen, and another from Liefde Bay.

In the absence of the male the determination is not quite certain; but I feel pretty sure, and the male has already occurred in Spitsbergen (7).

*E. tirolensis* occurs on the Grampians and Ben Nevis at high altitudes (11); also in Siberia and Nova Zembla (3), Tyrol, Switzerland, and Tatra.

7. *Coryphæus holmgrenii*, Thor. (1).

One adult male and seven adult females from Bear Island.

This is certainly the *C. mendicus*, L. Koch (3), of British authors, and almost certainly *Lophomma nivicola*, Strand (6).

Siberia, Nova Zembla (3), the north-east coast of Siberia (8), the Scottish mountains at high altitudes (11).

Mr. Elton did not find this species at Spitsbergen. It was the only one found at Bear Island.

8. *Micaria eltonii*, sp. n.

One adult male at Klaas Billen on August 9th, 1921.

This appears to be undescribed, and I have great pleasure in giving it Mr. Elton's name. I must, however, state that



at least four species of *Micaria* have been described from the Arctic regions ; these are :—*M. humilis*, Kulcz. (4), *M. centrocnemis*, Kulcz. (4), *M. ænea*, Thor. ('Remarks on Synonyms of European Spiders,' 1870–1873, p. 175), and *M. foveata*, Strand (5)—the two former from Siberia and the two latter from northern Norway. Of *M. labradoriensis*, Marx, from Labrador, I have no information beyond its existence.

*M. eltonii* may turn out to be the male of any of these, the first four of which are only known in the female sex ; but from the descriptions of these I should think it quite unlikely. The proper course seems to be to describe it now.

This is the first spider not an Argiopid to be found in Spitsbergen. It belongs, of course, to the family Clubionidæ.

*Facies*.—Resembles a large specimen of *M. pulicaria*, but has no white abdominal bands or spots. The specimen shows a few thick white hairs on each side of the cephalothorax near its base, but these are not numerous enough to be seen without a microscope.

*Length*.—Cephalothorax 1·5 mm., abdomen 2·1 mm., total 3·6 mm.

*Cephalothorax*.—Smooth, dark reddish brown, mottled and striped with deeper brown markings radiating from a dark wedge-shaped mark at the thoracic juncture. Covered with very fine white pubescence, and showing the aforesaid patches of thickened white hairs towards its posterior border.

*Sternum*.—Dark red brown, almost black, covered with long fine hairs and without squames.

*Eyes*.—Anterior row strongly procurved—*i. e.*, concave in front. Centrals the smallest, each more than a diameter apart and less than a diameter from the adjacent laterals.

Posterior row slightly procurved. Eyes subequal or centrals slightly less than laterals, all elliptical in shape. Centrals obliquely placed, more than a diameter apart and about the same distance from the laterals.

*Falces*.—Dark red-brown ; not rugose, bearing no squames, covered with long bristly hairs.

*Palpi*.—Maxillæ dark red-brown, with a whitish patch at the tip on the inner side.

Femur, patella, and tibia yellow-brown, marbled with darker brown, and darker above than below.

Tarsus dark brown, almost black, paler at the tip. It bears on its under surface between the palpal organs and the tip three long strong spines, the one present in some other species on the outer side being absent ; all these articles are covered with long simple hairs.

The patella is ·25 mm. long and ·15 mm. broad from side

to side, the former dimension measured laterally, the latter from above.

The tibia measures .22 mm. long and .13 mm. broad. At its distal end on the outer side it bears a subtriangular, pointed, semitransparent apophysis projecting obliquely forwards and outwards, and measuring .045 mm. as seen from above.

The palpal organs are rounded and convex. They show a small hook-like process between the middle and the apex, the tip of the hook being directed inwards. On the inner side near the apex is a corneous process, ending in a sharp point projecting forwards and outwards. A little white glistening membrane occupies the extreme apex of the palpal organs.

*Legs.*—Coxæ and trochanters yellow-brown with dark brown markings. Femora dark brown, with the exception of the basal halves of the four anterior ones, which are yellow-brown.

Femora i. and ii. each bear two spines above, one near the base and one near apex at the inner side.

Femur iii. also bears two spines, one on the distal and the other on the proximal third.

Femur iv. only shows the proximal spine.

All the remaining articles are dark brown.

Tibiæ and metatarsi i. and ii. clothed beneath with long hairs and bearing no long spines.

Tibiæ and metatarsi iii. and iv. each bear several pairs of long spines below; these are more or less concealed among the long hairs clothing the part, and are difficult to count.

Tarsi all scopulate, the four anteriors much more thickly so than the four posteriors.

Abdomen dark brown, almost black, sparsely covered with scattered, thick, iridescent hairs which do not form a pattern. There are faint indications of a pair of yellow-brown spots on the anterior third, followed by several chevron markings.

*Spinners.*—Upper spinners yellow-brown, lower spinners almost black.

The following is the analysis of Mr. Elton's total catch:—

Adult specimens .....	43
Immature (probably <i>L. sobria</i> ) .....	16
Immature and unrecognizable .....	33
Total .....	<hr/> 92

There was no indication that any of the immature specimens belonged to any species not included in the above list, but, of course, it is quite impossible to be sure.

Two species have been recorded from Spitsbergen which Mr. Elton did not meet; these are:—

*Leptyphantès hyperboreus*, Strand (10).—An adult male and an immature female.

*Micryphantès fuscipalpis*, C. L. K.—One female.

This is an extremely critical genus, and the identification is very doubtful. It is far more likely to be *M. nigripes*, Sim., or some other form. It is absolutely necessary to have males in order to be sure of the species.

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XIV.—*Note on the Genus Tragosa*, Gray. By ARTHUR DENDY, D.Sc., F.R.S., Professor of Zoology in the University of London (King's College).

THE genus *Tragosa* was proposed by Gray [1867] with *T. infundibuliformis* as its type-species. This species is the *Isodictya infundibuliformis* of Bowerbank [1866, 1874] and the *Halichondria infundibuliformis* of Fleming [1828] and Johnston [1842]. Perhaps this is as far as it is safe to go in tracing back the synonymy, but Johnston expresses

the confident opinion that his sponge is identical with the *Spongia infundibuliformis* of Linnæus.

The shortly-stalked, thin-walled, widely funnel-shaped form of the sponge is highly characteristic when taken in conjunction with the skeleton arrangement and spiculation. The species seems to occur abundantly in the neighbourhood of the Shetland Islands and Hebrides. Bowerbank records it from as far south as Guernsey.

Gray saw quite correctly that this species could not rightly be included in Bowerbank's genus *Isodictya*, nor yet in the older genus *Halichondria*, but he was very unfortunate in the diagnosis of his new genus *Tragosia*, which is quite inadequate. It runs as follows:—

“Sponge funnel-shaped or fan-shaped, branches anastomosing, minutely hispid. Skeleton regularly netted.

“The spicula of the primary lines of the skeleton are needle-shaped, with their apices directed inwards; those of the secondary lines are fusiform.”

I do not know why the second paragraph of this diagnosis is placed in inverted commas by Gray, but it contains a singular error, for the apices of the styli are, of course, not directed inwards, but, as usual, outwards. The character which seems especially to have impressed Dr. Gray in founding his genus is the presence of the two kinds of megascleres, stylole and oxoete, the former in the primary and the latter in the secondary lines of the skeleton. As this feature also occurs in Bowerbank's *Isodictya dissimilis*, Gray includes that species in his *Tragosia*. It was Dr. Bowerbank, however, who first pointed out the similarity of the two species in this respect, although they are very different as regards external form.

The genus *Tragosia* has been accepted by Vosmaer, Hanitsch and Topsent. The former, in Bronn's 'Klassen und Ordnungen des Thierreichs' [1887], reproduces a figure of the external form from Bowerbank, but he does little, if anything, to improve the diagnosis. I cannot, moreover, agree with him in considering Schmidt's genus *Cribrochalina* [1870] as a synonym of *Tragosia*. Schmidt's description leaves very little doubt that the type of his genus at any rate—*C. infundibulum*—is a true Chalinine sponge. Nor has the suggestion that Carter's *Semisuberites* [1877] may be another synonym been justified by subsequent events.

Hanitsch [1894] adds nothing to our knowledge of the genus, but his diagnosis is interesting because he expressly states that there are no microscleres. Topsent also, although

he has made use of the name *Tragosia* on several occasions, has not, so far as I am aware, done anything to extend our knowledge in this direction. We may safely say that hitherto the genus *Tragosia* has remained very badly characterized, and one can hardly be surprised that Carter [1876] completely ignored it and referred Bowerbank's *Isodictya infundibuliformis* to *Phakellia*; indeed, he seems to have actually confused the species with *Phakellia ventilabrum*.

We come now to the chief object of this note, which is to call attention to a hitherto-unnoticed element in the spiculation of *Tragosia infundibuliformis*, by the aid of which the confusion between *Tragosia* and *Phakellia* can at once be avoided and the genus placed upon a more satisfactory footing.

Some years ago I received from Sir W. A. Herdman three beautiful specimens of *Tragosia infundibuliformis* collected in the Minch and preserved in alcohol. The external form of these specimens is thoroughly typical and, taken in conjunction with the locality, left little doubt as to the identification. In order to make quite sure, however, I recently examined the spiculation of one of the specimens, and was much surprised to find numerous microscleres in the form of trichodragmata.

Before coming to the conclusion that trichodragmata really form a normal constituent of the spiculation, it was necessary to make a re-examination of specimens actually referred to the species in question by the older writers. In the first place, I found in Mr. Carter's cabinet a slide labelled "*Halichondria infundibuliformis*. Johnst. B. M. Shetland", which is evidently a preparation of *Tragosia infundibuliformis*, and which contains trichodragmata quite unmistakably. Unfortunately the same slide is also labelled, at the other end, "Type specimen *Phakellia robusta*, Bk." Two other slides, both labelled "*Phakellia infundibularis*" and "Deep Sea," are evidently from the 'Porcupine' collection, but they represent two distinct species. The one has trichodragmata and may be safely identified as *Tragosia infundibuliformis*; the other has no trichodragmata (so far as I can see) and much larger megascleres, and is probably referable to *Phakellia ventilabrum*. It is evident from what Mr. Carter says about these species in his paper on the 'Porcupine' Sponges [1876, pp. 239, 240], taken in conjunction with his preparations, that he failed to distinguish the one from the other.

There are in the Natural History Department of the British Museum a number of dry specimens undoubtedly

referable to *Tragosia infundibuliformis*. Two of these I examined microscopically. The first was labelled, in Bowerbank's writing, "*Halichondria infundibuliformis* Johnst.", to which had been added, apparently in Carter's writing, "T. S." and "*Isodictya inf. Bk.*," suggesting that Mr. Carter regarded this as the type-specimen of the species as accepted by Johnston and Bowerbank. The second was labelled "*Isodictya infundibuliformis* Bk." and "*Halichondria infundibuliformis* Sowerby." Both of these specimens had the typical external form, and both contained trichodragmata. There can be no doubt that they are specifically identical with the specimens obtained by Professor Herdman from the Minch.

I think we may now state confidently that the common British species upon which Gray's genus *Tragosia* was founded contains trichodragmata as constant and characteristic constituents of its spiculation, and may thereby be distinguished much more sharply from *Phakellia* than was formerly possible. The fact that these spicules have been completely overlooked by previous observers may probably be accounted for by their having examined only dry specimens, in which the shrinkage of the soft tissues makes it much more difficult to recognize them.

I have already, on more than one occasion [1916, 1921 A], called attention to the curiously sporadic distribution of this type of microsclere amongst the Tetraxonid Sponges, and suggested that it has probably arisen again and again in the course of evolution through parallel mutation. I have also doubted its value for purposes of generic distinction, and been, I fear, somewhat inconsistent in this respect. Thus I have refrained [1921 B] from separating *Cinachyra eurystoma*, which possesses trichodragmata, from the remaining nineteen species of the genus, which possesses none, while, in the same memoir, I refused to admit into the genus *Axinella* a species ("*Thinacophora*" *durissima*) which possesses trichodragmata, and also suggested that the presence of these spicules may be used as a means of distinguishing the genus *Mycale* from *Ægagropila* and *Esperella*. I have suggested, in short, that each case should be treated on its merits, without attempting to lay down a general rule. Where a generic diagnosis is quite inadequate, as in the case of *Tragosia*, the presence or absence of trichodragmata may well be taken into consideration.

Hallmann [1916-17], a few years ago, published a revision of the genera of so-called Axinellidæ containing microscleres, in which he mentions a considerable number

of species containing trichodragmata and makes extensive use of this form of spicule as a guide to classification. It is not necessary to criticize his conclusions in this place, except in so far as they concern the genus *Tragosia*. He did not, of course, know that *Tragosia infundibuliformis* contains trichodragmata, or he must have realized that his new genus *Axidragma* was not required.

The diagnosis of *Axidragma* may be quoted in full; it runs as follows:—"Axinellidæ typically of thin lamellar habit, stipitate, with even surface. Skeleton composed of primary lines of stylote megascleres, traversing the sponge in the direction of its growth, and of secondary lines (connecting-fibres?) formed of oxea; there is no special dermal skeleton. The megascleres are of the two forms mentioned, which are quite distinct in kind. The microscleres are trichodragmata accompanied or not by single trichites." This genus is proposed for Topsent's *Axinella padina* [1896], from the Gulf of Lyons, a species which is shown by the discovery of trichodragmata in *Tragosia infundibuliformis* to be closely related to, if not identical with, the latter.

It is quite clear that Hallmann's genus *Axidragma* should be abandoned in favour of *Tragosia*. The synonymy of the other Axinelline genera with trichodragmata is too difficult and complex a problem to be discussed in this place, but the study of these forms will probably be found to afford strong support to the view that the "Axinellidæ" are merely a heterogeneous assemblage of lipochelous Desmacidonidæ [cf. Dendy, 1921 A, B].

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### XV.—*Three new Races of Cephalophus monticola.*

By GILBERT BLAINE.

#### *Cephalophus monticola ludlami*, subsp. n.

A duiker of the *monticola* group from the Kafue River, N.W. Rhodesia, of which seven flat headless skins and two skulls have recently been added to the B.M. Collection.

They all come from the same locality, viz., the junction of the Lunga with the Kafue River, N.W. of the Victoria Falls, and are thus far removed from their eastern and southern relatives, *nyasæ* and *monticola*. The skins are very alike in general character, though some are rather more rufous than others.

The two skulls, from which the frontals are missing, are those of females. The largest of the two is the size of the type-specimen of *lugens*, Thos., although not yet fully mature. This duiker may therefore be considered a large representative of the group.

*Description*.—*Skin*. Texture of hair hard and shining like *lugens*. Colour: neck and shoulders mouse-grey, paler below. Dorsal surface umber-brown, darkening towards the rump to dark sepia on either side of the tail. Flanks pale greyish rufous, changing to bright rufous on the hams, and sharply contrasting with the sepia at the rump. Throat and underline of body dusky white. Legs bright rufous. Tail dark sepia above, white beneath.

The flat skin gives the general impression of being lighter and greyer in front, and darker and redder behind.

*Skull*. Breadth 63 mm.; occiput to nasals 83; upper tooth-row 31.



*Hab.* Junction of Lunga with Kafue River, N.W. Rhodesia.

*Type.* Female skin and skull imperf., B.M. no. 21.11.15.1, presented by G. S. Ludham, Esq.

A skin in the collection from N.W. Rhodesia, presented by Mr. R. L. Scott, is almost identical with this series, but is a little darker on the fore parts. The forehead of this specimen is dark umber-brown with rufous superciliary streaks.

*Cephalophus monticola ruddi*, subsp. n.

Resembles *nyasæ*, except that the head is greyer, with less distinctly rufous superciliary streaks; the central dorsal surface is a deeper brown, with a more abrupt change to rufous on the flanks; the fetlocks on all four legs are greyish brown, being rufous in *nyasæ*.

*Description.*—*Skin.* Nose, forehead, neck, and central dorsal surface to neck liver-brown, becoming darker at root of tail. Superciliary streak and cheeks greyish rufous; chin white; throat and underside of neck pale rufous; flanks and legs rich rufous; belly and inside of thighs ochreish white; fetlocks to hoofs greyish brown; tail dark liver-brown above, white beneath.

*Skull.* Length 127 mm.; breadth 57; tooth-row 36.

*Hab.* Sibedeni, N.W. Eshowe, Zululand.

*Type.* Adult female skin and skull, B.M. no. 4.5.1.81, presented by C. D. Rudd and collected by C. H. B. Grant.

This local race in colour resembles most nearly *nyasæ*, but is smaller. It differs from *monticola* in its darker and redder coloration.

In the Rudd Exploration Collection are three skins from the Gorongosa Mountains in Portuguese East Africa, which appear identical with the typical *monticola* of the Cape in being without rufous on the flanks, greyer on the underparts, and a duller rufous on the legs.

Thus a form indistinguishable from typical *monticola* is found intervening between the Zululand and the Nyasaland forms.

*Cephalophus monticola fuscicolor*, subsp. n.

A dark form from the Melssetter district, S. Rhodesia, in which the rufous tint characteristic of the *monticola* group is almost completely suppressed.

*Description.*—*Skin.* Upper parts uniform slaty brown, slightly darker on head, rump, and tail; fore legs the same

colour as the body, tinged with dull rufous only on the forearm above the knees; hind legs similar, but with rufous tinge on back of legs above hocks and between the hocks and fetlocks; superciliary streaks and sides of face pale greyish brown; underparts pale greyish brown; throat and inside thighs white.

*Hab.* Chirinda Forest, Melsetter, Rhodesia.

*Type.* Adult female skin, B.M. no. 8.7.19.36. Collected by C. P. M. Surgmerton, Esq.

The writer considers these characters of slight variations of colour and size to be of local and family value only, always likely to arise where animals by environment and habit are confined in widely-separated patches of country. Such as these little forest duikers probably never move more than a few miles from their birth-place, and keep within the limits of restricted and isolated belts or patches of dense bush or forest, where conditions are scarcely affected by change of season, and the plants on which they live are always present in abundance.

These conditions would encourage in-and-in breeding, producing an infinite variety of races in which small changes of size and colour would tend to become fixed characters.

Possibly in the great forest-tracts of Central Africa a greater individual variation would be apparent, but south of that region there are no great areas of forest, but only isolated belts and patches occurring here and there along the courses of rivers, or in mountain-ranges, or on the coast, at wide intervals, each possessing a local race stamped with its individual trait.

#### XVI.—On some new and rare British *Diplopods*.

By RICHARD S. BAGNALL, F.R.S.E., F.L.S.

It is desirable to make the following records, *Leptoiulus belgicus* and *Mastigonodesmus boncii* being additions to the British fauna, whilst *Isobates* sp. would seem to indicate, from observations in the field, a new species.

I regret that, living in hotels, away from my literature, specimens, and appliances, it is impossible to make any useful descriptions or remarks.

#### *Leptoiulus belgicus* (Latz.).

A graceful Julid, with a single white dorsal line and pale

underside, described by Latzel in 1884 in an appendix to Pseudhomme de Boire's "Note sur les Julides de la Belgique" ('Comptes Rendus de la Société Entomologique de Belgique'). Latzel figures the male organs.

I first discovered this species in a limited area in the grounds below Lincolme Drive, Torquay, October 1918, where it occurred in moderate numbers in dampish vegetable detritus chiefly consisting of dead bracken and coniferous needles. Only two males were secured, but, a month later, my friend Mr. J. Williams Vaughan collected me a further supply, which included a larger proportion of males.

First British record.

*Cylindroiulus nitidus* (Verh.).

Other than some of the original Staffordshire specimens, which my good friend Mr. S. G. Biade-Birks was good enough to send me, I have not seen male examples, and the following records refer to the female sex only.

STAFFORDSHIRE, Charlet Valley, near Froghall, and LINCOLNSHIRE, Harlaxton, August 1918 (*J. C. Varty-Smith*).

*Isobates* sp.

In the spring of this year I collected large numbers of a species very like *Isobates varicornis*, but lighter in colour, noticeably more slender and very much more rapid in its movements, being the most active Protoiulid I have observed. It is of a pale yellowish-brown colour, with large black lateral spots. Only one male, which awaits examination, was secured.

KENT, Leeds Castle, under elder-bark, 29. iii. 21; and HERTS, near Welwyn, under beech-bark, 1. iv. 21.

*Mustigonodesmus boncii*, Brölemann.

Whilst going through some tubes of *Macrosternodesmus*, I picked out a broken example which could be separated as apparently different by the naked eye. Thinking it might be a small example of *Ophiodesmus*, I examined it closely, and found that it agreed in every particular with specimens of the above species kindly presented to me by Brölemann. Unfortunately the single specimen was only a female, but, after comparison with specimens of *M. boncii*, I have no hesitation whatever in referring it to that species.

DURHAM, Gibside, with *M. pulicola*.

XVII—*The Mammals of the 1921 Mount Everest Expedition.*  
By OLDFIELD THOMAS, F.R.S., and MARTIN A. C.  
HINTON.

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THE 1921 Expedition to Mount Everest, under the auspices of the Royal Geographical Society and the Alpine Club, was intended to make a reconnaissance of the mountain, and try to find a route by which, another year, an attempt might be made to ascend the summit. Mr. A. F. R. Wollaston was appointed naturalist to the Expedition, but, as his duties included both the medical care of the climbers and the collection of all classes of zoological and botanical objects, he was naturally not able to devote any very large portion of his time to mammals. Those that he was able to get, however, have been of very great interest to us, and are the first series of mammals that have ever been received by the Museum from any such heights as 16,000'–17,000'.

In all they number fifty-two specimens, belonging to ten species, of which we have described two species and one subspecies as new. In addition, six other species were seen at high altitudes by Mr. Wollaston, but it was not possible to obtain specimens. Mr. Wollaston's notes upon these forms are incorporated below.

Of the novelties, the most striking is the new Pika, which we have named after Mr. Wollaston, and which he found up to so great a height as 20,000'. It is distinguished by not acquiring a fulvous mantle in the late summer, as is done by its nearest ally *Ochotona roylei*, the best-known Pika of the Himalayas.

When further expeditions go for the conquest of Mount Everest, we would urge whoever is interested in natural history to pay especial regard to the following points connected with the mammals of that mighty mountain, so as to supplement Mr. Wollaston's observations.

*Pikas*.—How soon are any Pikas met with on the ascent, and what is the highest point to which they attain? Specimens of Pikas from all altitudes should be secured, with the view of finding out if intermediate forms between *roylei* and *wollastoni* occur at intermediate elevations. And sets should be obtained at dates as widely separated as possible, so as to show the very peculiar seasonal changes of pelage to which these animals are liable, and on which their systematic classification largely depends.

*Voles.*—This group of rodents is likely to produce quite a number of further interesting forms, from all elevations. They are commonly found in highland meadows, and wherever mouse-holes are seen traps should be set—or, better still, if possible, attempts should be made to dig some out. The object of this is that as many specimens as possible should be obtained with unbroken skulls, as the series of this year's collecting has been very unfortunate in the extent to which the skulls have been broken by the traps. No effort should be spared to avoid breaking the skulls of any specimens captured, while any dried-up decedent carcasses that might be found should always be brought, as these would probably possess unbroken skulls. This note applies equally to all other forms of mammalian life.

As voles are difficult animals to induce to enter traps, it may be noted that for them bulbs of all sorts, including onions, are commonly a very attractive bait.

*Marmots.*—Owing to an unlucky accident, Mr. Wollaston did not obtain any adult marmots, and these are likely to be of decided interest. Assertions have been made as to a difference between the marmots of the northern and southern slopes; but no specimens suitable for testing the question are as yet available. Quite a number of skins from all localities and altitudes would be acceptable.

*Rats.*—Rats or rat-like rodents are stated to have been seen at the very highest elevations, and to have come into the tents to steal food. Unfortunately none were captured, and it is certain that examples of whatever animal this was would be of the greatest interest. It may possibly have been some form of mountain-vole, but is, in any case, nearly certain to be new to science.

We would add that, while the attention of a mountain expedition is naturally fixed on the higher altitudes, our knowledge of the animals of the lower levels is very far from complete, so that specimens from all places at all levels, whether near Darjiling, in the Chumbi Valley, or on the elevated plains of Tibet, whether rats and mice, moles, shrews, bats, hares, weasels, or any other mammals, are all of the utmost interest to scientific workers, and are likely to include many forms new to our present list of Himalayan mammals.

Finally, we may note that the 1921 Expedition has just not surpassed in its collection of mammals the altitude (17,900') recorded for a Peruvian mouse by Thomas in 1900, and we shall look to future expeditions to repair this omission. Wollaston's Pika was seen and handled at 20,000', but no specimens from that altitude were brought home.

[Wolf (*Canis laniger*, Hodgs.).

“Seen at 19,000'. Tracks in snow above 21,000'.”—*A. F. R. W.*]

[Fox (probably *Vulpes montana*, Pearson).

“Seen at 18,500'.”—*A. F. R. W.*]

### 1. *Mustela temon*, Hodgs.

♂. 40. Sunja La, 15,200', 29th Aug., 1921.

♀. 42. Khaita, Tibet, 12,000', 1st Sept., 1921.

### 2. *Mustela longstaffi*, Wrought.

♀. 24 (young). Tingri, Tibet, 14,000', 8th July, 1921.

### 3. *Marmota himalayana*, Hodgs.

♂. 32 (young). Thung La, Tibet, 16,000', 14th July.

Mr. Wollaston had the misfortune to have two fine adult marmot skins, with their skulls, stolen from his tent by prowling dogs, so that this young specimen is the only one brought home.

Himalayan marmots, especially those of the southern side of the dividing-line, are peculiar desiderata, as there has been great confusion in regard to their determination, owing to the majority of the available specimens having been kept in confinement. Blanford believed that those of the Tibetan side were different from those of Nepal, while Wroughton has placed them all under one heading.

### 4. *Cricetulus alticola tibetanus*, subsp. n.

♂. 30. Tingri, Tibet, 14,000', 7th July.

Distinguished from the typical subspecies by its longer tail and larger feet.

Size about as in *alticola*, but tail and hind feet longer, their measurements being 37 and 17 mm. respectively, instead of about 31 and 15.5. Tail with narrow median dusky streak along upper surface, instead of being wholly white. Colour and other characters as in true *alticola*.

Dimensions of type (measured in flesh):—

Head and body 103 mm.; tail 37; hind foot 17; ear 15.

Skull: condylo-incisive length 23.8; occipito-nasal length

26.5; nasals  $10.7 \times 3$ ; interorbital breadth 4.4; breadth of brain-case 11.7; palatal foramina  $5.2 \times 1.6$ ; dental length 12.6; cheek-teeth (crowns) 4.1.

*Hab.* Tibet. Only known from Tingri, 14,000'.

*Type.* Adult male. Original number 30. Collected by Mr. A. F. R. Wollaston, July 7, 1921.

Thomas described *C. alticola* from Shushal on the Pang-Kong Lake, Ladak, where it is found at an altitude of 13,500'; and it also occurs in the valley of the Upper Sutlej at Teza.

### 5. *Phaiomys leucurus*, Blyth.

1863. *Phaiomys leucurus*, Blyth, J. A. S. B. xxxii. p. 89.

1879. *Arvicola blythi*, Blanford, Sci. Res. Second Yarkand Miss., Mammals, p. 39 [*Microtus* (*Phaiomys*) *blythi* of subsequent writers].

♂. 1. Tinki Dzong, Tibet, 13,500', 17th June.

♂. 3, 10, 12, 20, 23, 27, 28, 29, & 31 in adult pelage, and 4, 5, 6, 7, 8, & 9 juv.; ♀. 2, 11 both adult. Tingri, Tibet, 14,000', 25th June to 10th July.

Blyth based his genus *Phaiomys* upon the present species. Blanford regarded *Phaiomys* as a synonym of "*Arvicola*" (= *Microtus* in current nomenclature), while subsequent writers have given it no more than subgeneric rank. In the genus *Arvicola* the specific name "*leucurus*" is preoccupied by *A. leucurus*, Gerbe, 1852; and therefore Blanford substituted the name "*blythi*" for that originally bestowed upon the present species by Blyth. But, in our opinion, *Phaiomys* is entitled to full generic rank; and, if this be the case, the specific name *leucurus*, given to the genotype by Blyth, is valid and must be restored.

*Phaiomys*, though still imperfectly known, is one of the most interesting microtine genera. By the peculiar combination presented by its external, dental, and cranial characters it is sharply distinguished from all its allies—although, taken singly, each of its characters can be found in other groups. Thus, as regards externals, the curious lemming-like form of these voles and their lengthened fore-claws can be matched among that little group of Central-Asiatic species of which *M. brandti* is a good example; the latter, however, differs widely in skull and teeth from the present genus. In certain, though not in all, respects, the cranial and dental characters of *Phaiomys*, as here understood, find their match in the North-American *Pedomys* and in the Eurasian *Arvicola*, genera of wholly dissimilar external appearance. Although detailed discussion of this interesting matter must be reserved

for another place, it may be mentioned that the features common to the three genera just named suggest, for each of them, descent—in directions more or less divergent—from the remarkable late Pliocene European genus *Minomys*; and no character in any one of the other three living genera seems to be incompatible with such a view of their origin.

Voles of the genus *Phaiomys* are confined to the highlands of Central Asia, where they are widely distributed, occurring always at high altitudes and most frequently in close association with the banks of streams. The species show two well-marked types of coloration—some, like *P. leucurus*, being pallid and sandy, others, like *P. waltoni*, darker and greyer.

With regard to the material collected by the Expedition, we are, at present, unable to find any reliable character which will serve to distinguish the specimens from Tinki Dzong and Tingri from *P. leucurus*, which was originally described from the mountains above Tso-Moriri, Ladak. It is, however, quite possible that the Tibetan animal will prove to be distinct from true *leucurus*. The series from Tingri, long as it is, is insufficient for the purpose, owing to the fact that so many of the skulls collected have been smashed by the traps.

It may be recorded that the mammary formula in the two females is  $2-2=8$ , and that the pelage of the young approaches that of the adults of the next species in colour, being far darker and less sandy than in adult *leucurus*.

“Found in colonies in sand.”—A. F. R. W.

#### 6. *Phaiomys everesti*, sp. n.

♂. 61; ♀. 49. East Everest, 17,000', 9th and 18th September.

A “grey” species, closely related to *P. waltoni*, but considerably smaller.

Size small (hind foot to 18, condylo-basal length not much exceeding 27 mm.).

External characters and colour as in *P. waltoni*, but tail light above and below, instead of being more or less bicolored; upper parts of a rather dark earthy grey, very different from the sandy tints of *P. leucurus*. Mammaræ  $2-2=8$ .

Skull and teeth essentially as in other species of the genus. Skull rather lightly and delicately built with small flattened bullæ; the latter rather smaller than in *waltoni*, and differing conspicuously from the large and inflated bullæ of *leucurus*.



Dimensions of the type (measured in the flesh):—

Head and body 101 mm.; tail 30; hind foot (without claws) 18; ear 11.

Skull: condylo-basal length 26·8; interorbital constriction 3·9; breadth of brain-case 12·1; occipital breadth 12·4; occipital height (median) 6·6; least distance across temporal ridges, (a) at interparietal 7·3, (b) in interorbital region 0·3; nasals 6·6 × 3·2; dental length 16·9; molars (at grinding-surface) 6·3.

*Hab.* East Everest, at high altitudes (17,000').

*Type.* Adult male. Original number 61. Collected Sept. 18, 1921, by Mr. A. F. R. Wollaston.

In fully adult or old skulls of this genus the temporal ridges fuse anteriorly to form a sharp but low median inter-orbital crest; and those portions of the brain-case which are under the influence of the temporal muscles suffer a transformation in the passage from youth to age exactly similar to what occurs in the Orkney voles\*. In the skull of the type of *everesti* the temporal ridges are nearly fused, and the specimen has attained a stage of development which in *P. leucurus* is only reached when the condylo-basal length has risen to about 29 mm. The skulls of the types of *P. waltoni* (Lhasa, Tibet) and *w. petulans* (Upper Sutlej Valley) are the only specimens of those forms sufficiently perfect to be used for comparison; in that of *waltoni* the condylo-basal length is 27·5, while in *w. petulans* it is 26·4 mm. In both skulls the temporal ridges are still very feeble and widely separated (by 1·5 and 1 mm. respectively), so that these specimens, in a craniological sense, are still far from being adult. One may conclude from these facts that *P. waltoni* attains a considerably greater size than that attained by *everesti*, and that in this respect *w. petulans* is intermediate.

"In colonies on turf-slopes."—A. F. R. W.

#### 7. *Microtus (Alticola)* sp.

♂. 55 juv. East Everest, 17,300', 13th September.  
Too young for precise determination.

[Hare (probably *Lepus oiostolus*, Hodgs.).

"Common at 14,000'–15,000' in dry country. One seen at 18,500' N.E. of Everest."—A. F. R. W.]

8. *Ochotona roylei nepalensis*, Hodgs.

♀. 38, 39. Kama Valley, 12,000'–13,000', 24th August.

On laying out all the available Himalayan specimens of this group—some sixty in number,—from localities ranging from Kashmir on the west through Kumaon to Nepal, we have come to the conclusion that three subspecies may be recognized of *O. roylei*. Its type-form would be that of Kumaon, where Strachey obtained specimens exactly matching Ogilby's type from the "Choor Mountains" (presumably Chaur Peak, near Simla). And a synonym of it would be *O. hodgsoni*, Blyth, two of whose three originally mentioned localities are in the range of *O. roylei roylei*.

Then on the west the somewhat greyer, but not materially different *O. wardi* of Kashmir and Hazara should be termed *O. roylei wardi*, while eastwards in Nepal Hodgson's *nepalensis*, in turn darker than *roylei*, would be a third subspecies, found in a more saturate region. The relation to these three of *O. r. chinensis*, Thos., described from still further east at Ta-chien-Lu, we are at present unable to be certain about, owing to the absence of specimens showing the seasonal phases. The type of that form was killed in May, so that there is no evidence as to whether or no it takes on a rufous mantle in the later summer.

"Only seen at the altitudes above recorded. Found in wet valleys."—A. F. R. W.

9. *Ochotona wollastoni*, sp. n.

♂. 34; ♀. 35. Puse La, 16,500', 28th July.

♂. 36. E. Mt. Everest, 17,500', 6th August.

♂. 41. Kama Valley, 15,800', 29th August.

♂. 48; ♀. 37. Kharta Valley, 14,500', 15,000', 6th September, 23rd August.

♂. 51, 52, 53; ♀. 50, 54, 59, 60. E. Everest, 17,000', 17,500', 9th–16th September.

A grey Pika of the size of *O. roylei*, without contrasted rufous at any season.

Size about as in *O. roylei*, of which the subspecies *nepalensis* was also obtained by the Expedition. General colour above light grey with a slight drabby tinge, the tips of the hairs blackened. No conspicuous seasonal changes, the new summer fur coming up of practically the same colour as the warm winter fur. Head and shoulders without strong rufous, the species contrasting in this respect with all the subspecies of *roylei*, in which these parts turn a more or less

brilliant red by August. Under surface the usual mixed greyish colour, the bases of the hairs blackish slaty, their tips whitish. Middle area of face more or less fulvous, succeeded behind on the crown by grey, about like that of the back, but when in worn pelage this part often looks nearly black. Sides of face grey. Ears large, their hairs white internally, blackish externally, a narrow line along the edge white. A large area behind each ear greyish white, sometimes with a buffy suffusion, extending up more or less on to the nape, and so forming a prominent greyish collar. A little buffy commonly present, running along the boundary between the upper and lower colours from the muzzle to the level of the elbows. Rump grey like the rest of the back, not of a warmer tone as it generally is in *roylei*. Anal area inconspicuously white. Hands and feet greyish white without tendency to buffy, a little darker grey on the middle of the metapodials.

Skull essentially as in *roylei*. Frontals in all the specimens fenestrated, but this is a variable character in other species. Bullæ as in *roylei*, not as in *macrotis*.

Dimensions of the type (measured in flesh):—

Head and body 184 mm.; hind foot 30; ear 36.

Skull: greatest length 45; condylo-mcislve length 41.5; zygomatic breadth 22.5; nasals  $16 \times 5.5$ ; interorbital breadth 5.5; breadth across brain-case above meatus 18.5; palatal foramina 13.3; width of palatal bridge 1.5; antero-posterior length of bullæ 10. Upper tooth-series (alveoli) 8.2.

*Hab.* Mt. Everest, at altitudes from 14,500' to 20,100'. Type from 17,500'.

*Type.* Adult female. Original number 54. Collected 12th September, 1921. Thirteen specimens.

This species, while no doubt by its general characters and size of skull nearly allied to *O. roylei*, is yet clearly distinct by the complete absence of the brilliantly contrasted rufous mantle on the head and fore-quarters which comes on in that species during the late summer. And even in the early summer, before the rufous has begun to appear, *O. roylei* has a warmer tone on the rump than on the middle back, which is not the case here, and the feet have always some tone of yellowish or brownish as compared with the white feet of *O. wollastoni*. It is, however, possible that forms connecting it with *roylei* on the west, or *chinensis* on the east, will yet be found, in which case a trinomial will have to be used for it.

This Pika, on whose discovery Mr. Wollaston is to be congratulated, appears to be the mammal which has its

habitual home at the highest altitude of any in the world. Although he did not bring any specimens from higher than 17,500', Mr. Wollaston killed some at 20,100'—a height probably only rarely surpassed by wandering wolves, or, perhaps, *Pantholops*,—but as a habitual home this is probably the highest in existence.

Incidentally we may note that a mouse (*Phyllotis sublimis*) was described by Thomas in 1900 from an altitude of 17,900' in Peru.

It will be of interest, on the one hand, actually to have specimens from 20,000', and, on the other, to find out how low it ranges, and whether it intergrades at all with the Nepalese form of *O. roylei*, which was obtained by the Expedition at 12,000'–13,000' in the Kama Valley.

"We found this Pika from 14,500' to the snow-line; the highest seen were at 20,100', only in mountainous and rocky country."—*A. F. R. W.*

#### 10. *Ochotona curzoniae*, Hodgs.

♂. 14, 16, 21; ♀. 15, 17, 18, 19, 22, 25, 26. Tingri, Tibet, 14,000', 2nd–7th July.

As very few examples of this Pika were in the Museum collection, the present series forms a valuable addition to the material for the study of the group. The majority of the specimens are in changing pelage, and three of them are young.

"Between 14,000' and 15,000' on dry plains, where they burrow in soft ground."—*A. F. R. W.*

[Chiru (*Pantholops hodgsoni*, Abel).

"Horns seen in possession of natives, supposed to have come from about 20 miles north of Tingri Dzong."—*A. F. R. W.*]

#### 11. *Procapra picticaudata*, Hodgs.

♂. Skull and mask. Near Kamba Dzong, at about 16,000'. Presented to British Museum by Lt.-Col. C. Howard Bury.

"On plains at 15,000'. Kamba Dzong."—*A. F. R. W.*

[Bairbel (*Pseudoris nayaur*, Hodgs.).

"16,000' and above. Tracks and droppings found at 20,000'. Kamba Dzong."—*A. F. R. W.*]

## XVIII.—On some new Forms of Ochotona.

By OLDFIELD THOMAS.

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WHILE working out the Pikas obtained by Dr. Wollaston on Mt. Everest, the following new forms of the genus have been noted, and may be now described.

These animals are of unusual difficulty owing to their great and almost continuous changes of pelage, so that for a satisfactory knowledge of any species, even from a single locality, quite a number of specimens are needed—ranging in date at least from May to September, during which period most of the seasonal change takes place. Once in the winter pelage, no further change occurs until the following May.

*Ochotona nubrica*, sp. n.

A small species of the *roylei* group.

General colour of the specimens available about as in early summer specimens of *O. roylei wardi*, or rather paler grey. Fur not very long, hairs of back in a summer skin about 12–13 mm. in length. Face, nape, and shoulders grey, with a slight fulvous tinge; hind back clearer grey, the rump again more drabby. No evidence that a rufous mantle is acquired in the late summer, as it is in *roylei*. Under surface, as usual, with the hairs dark slaty at base, whitish terminally. Ear-patches dull buffy whitish, not very large or conspicuous. Area below ears buffy. Ears of moderate size, blackish behind, with white edges.

Skull decidedly smaller than that of *O. wardi*, and narrower in proportion, the breadth across the brain-case much less than in *roylei* or its Kashmir representative *wardi*, and still more so than in *macrotis*. Palatal foramina very widely expanded in their posterior half, much more so than in the other species. Bullae small and looking narrow, owing to their being apparently more vertically placed, like a disc nearly on edge.

Dimensions of the type (measured in the flesh):—

Head and body 184 mm.; hind foot 33; ear 21.

Skull: greatest length 42; condylo-incisive length 39; zygomatic breadth 19.5; nasals 14.3 × 4.7; interorbital breadth 4.2; breadth across brain-case 15.4; palatal foramina 10.5 × 4.6; palatal bridge 2.4; antero-posterior length of bulla 10.

*Hab.* Ladak, along the Nubra Valley, down to the Pang-Kong Lake. Type from Tuggu, Nubra Valley, alt. 10,000'.

Other specimens collected by C. A. Crump for Col. A. E. Ward from Thuit on the Nubra and Shushal on the Lake.

*Type.* Adult male. B.M. no. 7.9.6.17. Original number 10. Collected 24th June, 1907, and presented by H. Holmes-Tarn, Esq.

This little species was taken for Blanford's *Lagomys auritus* by Bonhote, for the very natural reason that the type-locality of that animal was just where it occurred—on the Pang-Kong Lake. But closer study shows that its skull is smaller and much narrower than that of *O. macrotis*, of which I believe *auritus* to be a synonym, and that its palatal foramina are of different shape, so that it is evidently a distinct species.

Specimens of this species are marked by both Holmes-Tarn and Crump as occurring in thick jungle or scrub, and there may be a difference in the local habitation of the larger species found in the same region.

*Ochotona roylei baltina*, subsp. n.

A pale grey subspecies, replacing to the north-west of Ladak the Kashmir *O. r. wardi*.

Size and essential characters as in true *roylei*, a fulvous mantle on head and fore back no doubt present in the late summer. General colour of back very pale grey, nearest to "pale drab-grey" of Ridgway. Crown with indications of a fulvous mantle coming later. Nape with the buffy-whitish patches well marked.

Other characters and skull as in *O. r. wardi*.

Dimensions of the type:—

Head and body 180 mm.; hind foot 32; ear 27.

Skull: upper length 44; condylo-incisive length 40; zygomatic breadth 21; interorbital breadth 5; breadth of brain-case 17.5; length of bulla 9.8; upper tooth-row 8.

*Hab.* Baltistan, N.W. of Ladak. Type from Nurh, on the Indus, just east of Skardo, 13,000'. Another specimen from Tashgam, 9500' (C. A. Crump).

*Type.* Adult male. B.M. no. 8.7.6.129. Original number 27. Collected 11th June, 1905, by Pearl and presented by Col. A. E. Ward.

Essentially similar to the Kashmir *O. r. wardi*, but distinguished by the greater paleness of its general grey colour, which is about as in *O. macrotis*.

I have had some doubt as to whether this might be Blanford's "*Lagomys auritus*," whose type-locality was on the Pang-Kong Lake, but all details of his excellent figures of the skull, notably the breadth across the brain-case, agree

better with *O. macrotis* than with the present form. And Blanford seems himself to have at first taken for *auritus* a specimen which he afterwards found to have come from the type-locality of Günther's species. As a consequence, *auritus* should be considered as a synonym of *macrotis*, which is certainly found in the part of Ladak immediately north of the Pang-Kong Lake.

*Ochotona curzoniae seiana*, subsp. n.

A representative of *curzoniae* in Seistan.

General characters very like those of true *curzoniae*. General body-colour rather greyer, practically without any brownish suffusion. Under surface washed with pale buffy. Tip of muzzle and of chin black, as in *melanostoma*, this being little perceptible in *curzoniae*. Light area behind ears smaller and less conspicuous than in either *curzoniae* or *melanostoma*.

Skull in most respects quite like that of *curzoniae*, but the supraorbital ridges, as in *melanostoma*, are less developed, hardly perceptible as ridges, and not overhanging the orbit. Incisors slightly more proodont than in either of the allied forms, but with the same strongly projecting inner flange, in this respect contrasting with *rufescens*, which is also far less proodont than any of the present group.

Dimensions of the type (measured on the spirit-specimen before skinning):—

Head and body 152 mm.; hind foot 29; ear 19.

Skull: median length 41; condylo-incisive length 35·7; zygomatic breadth 21; nasals 12·7; interorbital breadth 4·1; breadth across brain-case 15·8; palatal foramina 11·5; antero-posterior length of bulla 10·6; upper tooth-series 8.

*Hab.* Seistan.

*Type.* Adult female, skinned out of spirit on arrival. B.M. no. 6. 1. 2. 12. Indian Museum no. 7983. Collected by the Seistan Boundary Commission of 1905. Presented by the Indian Museum, Calcutta.

The peculiarity of the occurrence of a species so like *O. curzoniae* as this in Seistan was not appreciated at the time of its arrival, owing to the ranges of the Indian Pikas not being then at all worked out. Now we know that true *curzoniae* only occurs in Sikkim and Tibet, Tingri in the latter country being its most western record. Its recurrence far to the west in Seistan is therefore a notable instance of discontinuous distribution.

From the species that one would have expected in Seistan, *O. rufescens*, this Pika is readily distinguishable externally

by its black-backed ears and hidden digital pads, and cranially by its much more proodont incisors.

Buchner's *O. melanostoma*, from Kan-su and the Koko-Not regions of Tibet, is another form very closely allied to *erzsonia*, and can, at most, only be recognized as a subspecies of it.

*Ochotona gloueri*, sp. n.

A Pika allied to *O. erythrotis*, Buchn., but without a reddish mantle in the summer pelage. Bullæ smaller.

Size large, about as in *O. erythrotis*. General colour of body dark lined greyish, with black tips to the hairs. Nape with obvious but not conspicuous post-aural drabby-white patches, the specimen being in summer pelage. Under surface soiled greyish, the hairs slaty at base, whitish terminally. Sides and top of muzzle dull fulvous; cheeks grey, crown darker grey. Ears, apart from the brownish margin of the proectote, deep cinnamon, the metentote a little paler than the proectote; extreme edges, as usual, whitish. Hands and feet above white, the brush below dull brown.

Skull as figured in *erythrotis*, but the bullæ not so large. Palatal bridge apparently broader.

Dimensions of type.—

Head and body 204 mm.; hind foot 31.

Skull: upper length 46; condylo-incisive length 13; zygomatic breadth 23.5; interorbital breadth 6.2, breadth of brain-case 19; palatal bridge 2.8; antero-posterior length of bulla 10; upper tooth-row (alveoli) 9.

*Hab.* W. Sze-chwan. Type from Nagehuka, 10,000'.

*Type.* Adult male. B.M. no. 13.9.13.17. Collector's number 213. Harvard number 7589. Collected 10th August, 1908, by W. R. Zappey.

This species was assigned by Mr. Glover Allen to Buchner's *erythrotis*, and it is undoubtedly nearly allied to that species. But in August, if the same as *erythrotis*, it should have a rufous or fulvous mantle, and there is no trace of this in the specimen. Its bullæ are also smaller than those figured in *erythrotis*.

The value of these characters has been impressed on me by my recent studies of the genus, but it is not surprising that, at a time when such a study was impossible for want of material, Mr. Allen did not think them sufficient for distinguishing the species. In now doing so, I have much pleasure in naming this striking red-eared Pika in his honour.



*Ochotona sikimaria*, sp. n.

A small Pika closely allied to *O. thibetana*\*, but with smaller bullæ.

Size small, much smaller than in the other Himalayan species, *O. roylei*, of which *O. hodgsoni* is a synonym. General colour in winter a quite uniform lined brown more or less similar to that of a large water-vole or a *Sigmodon*, the general tone ranging from "Piout's brown" to "cinnamon-brown." In summer there is a slight indication of lighter shoulder- or neck-patches, but the material is not sufficient to indicate this satisfactorily. Under surface mixed brownish and grey, very much as in *thibetana*. Ears with proectote and outer half of metentote black; metectote with light-coloured fluffy hairs; inner half of metentote whitish; extreme edge of ear contrasted white. Hands and feet brownish; sole-tufts blackish brown.

Skull closely like that of *thibetana*, and consequently far smaller than in *roylei*. The interorbital constriction is of about the same breadth, but the brain-case averages a little narrower. The chief difference, however, is in the bullæ, which are uniformly much smaller than in *thibetana*, being barely over 8 mm. in antero-posterior length, as compared with 9 or upwards in *thibetana*, and they are also less inflated.

Dimensions of the type (measured in flesh):—

Head and body 165 mm.; hind foot 28; ear 19.

Skull: upper length 36.2; condylo-basal length 34.5; zygomatic breadth 16.6; nasals 11×4.6; interorbital breadth 4.1; breadth at back of frontals 11.5; breadth of brain-case 13.7; palatal foramina 9; palatal bridge 1.8; antero-posterior length of bulla 8.4; upper molar series (alveoli) 7.4.

*Hab.* Sikkim. Type from Lachen, 8,800'; other specimens from Chola Range, 12,000' (*Blanford*), Jongii (*Blanford*), and Gnatong, 12,300' (*Crump*). One specimen from B. H. Hodgson's collection, no doubt obtained when he was at Darjiling.

*Type.* Adult male. B.M. no. 15.9.1.231. Original number 6131. Collected 31st December, 1914, by C. A. Crump. Presented by the Bombay Natural History Society.

This is evidently the common Pika of Sikkim, and has been obtained there ever since Hodgson's time. But for one

\* Although spelt *thibetana* in the 'Recherches,' this name was published as above in the original description in the 'Nouvelles Archives.' The same invalid change was made in the case of *Macacus thibetanus*.

reason or another it has been confused with *O. roylei*, and never distinguished till now. Blanford's specimens had broken skulls, so that he was not able to see the great difference in size between it and *roylei*, while Bonhote unaccountably referred it to *hodgsoni*, a form undoubtedly synonymous with *roylei*, as may be seen by the figure of the skull given in the original description.

From *roylei* it is not only distinguished by its much smaller size, but by its brown instead of grey colour, and the absence of any seasonal fulvous mantle.

But to *O. thibetana* it is far more nearly allied, and can only be separated by the smaller bullæ. Possibly it may prove to be more properly a subspecies of *thibetana*, but I should not be justified in assuming that intermediate specimens occur without seeing material from the intermediate area of Bhotan and South-western Tibet.

The *thibetana* group is widely distributed over Tibet and China, and the present forms its furthest western extension.

*Ochotona zappeyi*, sp. n.

Near *O. thibetana*, but with narrower skull and less uniformly brown back.

Size about as in *thibetana*, though the skull is longer. General colour lined blackish grey, this colour covering the greater part of the back. But the shoulders are washed with drabby, and there are large post-aural drabby whitish patches on each side of the nape. Crown washed with dull drabby. Ears with the proectote black at base, grey distally, while in *sikimaria* it is wholly black. Marginal part of inner surface brown, inner part grey; extreme edge white as usual. Under surface greyish white, lighter and more sharply defined than in *thibetana*, the chest, however, drabby brown as in that animal. Hands and feet whitish instead of pale brown; sole-brushes blackish brown.

Skull longer and narrower than that of *thibetana*, with very narrow interorbital region and brain-case. Rudimentary postorbital processes well marked in the single specimen. Bullæ narrower and a little longer than in *thibetana*, much larger than in *sikimaria*.

Dimensions of the type:—

Head and body 170 mm.; hind foot 28.

Skull: greatest length 39 mm.; condylo-incisive length 36; zygomatic breadth 17·8; nasals 1·33 × 4·5; interorbital breadth 3·7; post-squamosal breadth 11·8; breadth of brain-

case 14.3; palatine foramina 10; palatal bridge 2; antero-posterior length of bulla 9.5; upper tooth-series (alveoli) 6.7.

*Hab.* W. Sze-chwan. Type from Shu-o-lo (Tschuwo), Nia-nong, N.W. of Ta-chien-lu. Alt. 13,000'.

*Type.* Adult male. B.M. no. 13. 9. 13. 16. Collector's number 246. Harvard number 7601. Collected 20th August, 1908, by W. R. Zappey. Received in exchange from the Museum of Comparative Zoology, Harvard.

The light nape-patches are no doubt less developed in winter, but, as I have had for comparison an August specimen of *thibetana* collected by Mr. Anderson, I have been able to see that they are certainly more conspicuous in *zappeyi* than they are in *thibetana*.

This species was named *O. hodgsoni* in Mr. Glover Allen's admirable paper on Sze-chwan mammals, he, like other people, having been deceived by the confusion which has surrounded the determination of these small Pikas, and especially by the mistaken identification of the somewhat similar Sikim species with *O. hodgsoni* by Bonhote. I have named it after Mr. Zappey, who made the fine collection in which it occurs.

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### XIX.—*Some Notes on Ferret-Badgers.* By OLDFIELD THOMAS.

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OWING to their extreme external resemblance to one another, all the ferret-badgers have usually been considered as of one genus, though sorted into groups according to the sizes of their teeth. The differences in the teeth, however, are so great that I consider that the large-toothed forms (*Melogale*) and the small-toothed forms (*Helictis*) should be generically distinguished, especially as the characters of the baculum both confirm the division and indicate a reason for the separation of a third genus for the N.-Borncan species *Helictis everetti*. Merely going by the teeth, the position of this species had been somewhat doubtful and a cause of hesitation in the frank separation of the groups.

So far as appears, *H. everetti* would appear to be annectant  
*Ann. & Mag. N. Hist.* Ser. 9. Vol. ix. 13

to the other two groups and more or less near some common ancestor of theirs\*.

The following synopsis gives a brief indication of the characters by which the three genera may be distinguished:—

A. Outer edge of  $p^4$  distinctly convex.

- a. Teeth large and heavy.  $P_2$  disproportionately larger than  $p_1$ . Baculum bifid, the terminal prongs much thickened, and one of them forming a curved crest. . . . . 1. *Melogale*.

Range. Mainland area from Nepal to Cochin China, and Java.

Genotype. *Melogale personata*, Geoff.

- b. Teeth small.  $P_2$  not disproportionately larger than  $p_1$ . Baculum bifid, but the prongs simple, scarcely thickened, and not crested. 2. *Nesictis*, gen. nov.

Range. North Borneo.

Genotype. *N. everetti* (*Helictis everetti*, Thos.).

B. Outer edge of  $p^4$  straight or faintly concave medially.

- c. Teeth small.  $P_2$  not disproportionately larger than  $p_1$ . Baculum trifid, with three slightly thickened terminal prongs set in a triangle. . . . . 3. *Helictis*.

Range. Assam, China from Canton to Shanghai, Hainan, Formosa.

Genotype. *Helictis moschata*, Gray.

Three new forms of the group appear to need description:—

*Melogale personata laotum*, subsp. n.

Size averaging a little less than in true *personata* of Pegu. General colour slightly greyer, less brown, and with more grey suffusion on the sides of the lower surface.

Teeth smaller, the molar especially smaller than in *personata*. In three specimens of *personata* the carnassial has a greatest diameter of 10·3, 10·2, 9·3 mm., while in five of *laotum* this dimension is 9·2, 9·0, 9·0, 9·0, 8·6. The difference is more marked in the molar, its greatest diameter in *personata* 9·0, 8·9, 8·7, and in *laotum* 8·2, 8·2, 8·1, 8·1, 7·7, with its internal antero-posterior diameter 5·5, 5·5, 5·2, as

\* A specimen of *M. personata* from Rangoon, which lived in the Zoological Gardens, and has been kindly lent to me by Mr. Pocock, presents the difficulty that its baculum is almost exactly like that of *Nesictis everetti*. But the specimen is immature, with its bones and teeth in poor condition, and the penis-bone itself not of the hard glossy substance that is usual in well-grown bacula. I believe that this is a case of arrested development due to confinement and immaturity, the arrest having taken place at the same stage of growth as that shown in the adult by the annectant and perhaps ancestral *Nesictis*.

compared with 4.6, 4.5, 4.5, 4.4, 4.2 in the new form, the antero-internal flange of this tooth almost obsolete.

Dimensions of the type (measured in flesh):—

Head and body 378 mm.; tail 161; hind foot 62; ear 31.

Skull: greatest length 80; condylo-basal length 77.3; zygomatic breadth 46; interorbital breadth 19.3; breadth across cranial ridges 14; mastoid breadth 37; palatal length 40; front of canine to back of  $m^1$  27.3.

*Hab.* North-eastern Siam; type from Nan, alt. 200 m.

*Type.* Adult male. B.M. no. 1. 11. 8. 5. Original number 125. Collected 7th November, 1900, and presented by Th. H. Lyle, Esq. Five specimens.

Judging from an imperfect specimen sent by Dr. Vassal, this small-toothed form apparently passes down into Annam, while in Camboja and Cochin China the genus is represented by *M. pierreii*, Bonhote.

Another ferret-badger from Tonkin has still smaller teeth:—

*Melogale tonquinia*, sp. n.

Size doubtful, but the single immature skull is already rather longer than in adult female *N. p. luotum*. General colour brown rather than grey. White head-markings at a maximum, the white nape-band expanded on the crown to within half an inch of the pre-aural light stripe, which is connected behind the eyes with the frontal patch. Dark eye-rings narrow. Ears completely whitish, inside and out. Light colour of cheeks, throat, chest, and inguinal region strongly suffused with yellow—though this is probably an individual peculiarity. Forearms and hind limbs brown, hands and tips of toes white.

Teeth decidedly smaller than in other species, the greatest diameter of  $p^4$  only 8.0 mm., the transverse diameter of  $m^1$  6.7, and the internal antero-posterior diameter of the latter only 3.8 mm.; similarly, below the carnassial is only  $7.6 \times 3.7$  mm.

Dimensions of type:—

Head and body 350 mm.; hind foot 58.

Skull: greatest length 79. Teeth as above.

*Hab.* Ton-kin. Type from Yen-bay, Song-koi River.

*Type.* Immature female. B.M. no. 12. 4. 21. 4. Collected 12th September, 1911, by H. Orri. Purchased of Alan Owston.

Although the coloration of this animal has a certain

amount of peculiarity, the real reason for its distinction lies in the comparatively small size of the teeth, by which it is distinguished from the other species of *Melogale*. The teeth of the type are unworn and quite perfect.

*Helictis subaurantiaca modesta*, subsp. n.

Essential characters of true *subaurantiaca*, this species differing from the continental *H. moschata* by its smaller size. General colour as in the typical form, except that the white head-markings are greatly reduced. The usual frontal white patch between eyes almost obsolete, a few odd hairs alone white. White of cheeks not rising up to eye, the brown bar below the eye over 5 mm. in breadth. Broad white band between eye and ear reduced to a narrow line, between which and the ear there is a broad area of brown continuous with the general brown of the upper surface. Back of ears brown, the edges only white. Nape-line much reduced, interrupted on the neck, and only reaching to the withers.

Skull as in *subaurantiaca*.

Dimensions of the type (measured on skin):—

Head and body 338 mm.; tail 148; hind foot 53.

Skull: median length 79·5; zygomatic breadth 45; inter-orbital breadth 20; mastoid breadth 38; front of canine to back of  $m^1$  24; combined length of  $p^4$  and  $m^1$  10.

*Hab.* Mountains of Central Formosa. Type from Bankoro.

*Type.* Adult male. B.M. no. 8.4.1.53. Original number 70. Collected 30th March, 1907, for Mr. A. Owston. Purchased.

Distinguished from *subaurantiaca* in very much the same way as true *moschata* is from *ferreogrisea*—that is, by the lesser amount of the white head-markings. Both the latter are larger than the Formosan forms.

XX.—On the *Systematic Arrangement of the Marmosets.*

By OLDFIELD THOMAS.

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THE necessity for relabelling the Museum collection of Marmosets has caused an examination into the question as to how many genera of these animals should be recognized,

their earlier division simply into two by the characters of the teeth having been rejected by Elliot \*, whose arrangement in turn has been modified by Pocock †.

Elliot recognizes five genera, as follows :—

*Seniocebus*, with type *bicolor*.

*Cercopithecus*, type *midas*.

*Leontocebus* (type *chrysomelas*), with two subgenera, *Tamarinus* (type *mystax*), and *Marikina* (type *chrysomelas*).

*Ædipomidas*, type *ædipus*.

*Callithrix*, type *jacchus*.

Pocock modifies this, largely on the characters of the ears and feet, to the extent of rejecting *Seniocebus*, which he unites under the name of *Mystax* with *Cercopithecus* and the “*Tamarinus*” subgenus of “*Leontocebus*,” recognizing *Leontocebus* as a full genus, and, of course, also recognizing *Callithrix*, which he rightly, for the time being, calls *Hapale*. His four genera are thus :—

*Leontocebus*, type *chrysomelas*.

*Ædipomidas*, type *ædipus*.

*Mystax*, type *mystax*.

*Hapale*, type *jacchus*.

But it appears to me that in this scheme there is no very satisfactory place for the *Seniocebus* section (type *bicolor*), for while the general appearance and short-haired or naked face of its members show relationship to the short-eared *Ædipomidas*, their ears are as long as in *Mystax*. To get out of this difficulty I would suggest that we should recognize *Seniocebus*, with which, besides the naked-faced *bicolor*, *martinsi*, and *meticulosus*, we might place *leucopus*, with face short-haired, though not naked.

It is noteworthy that all the groups, used here for convenience' sake as genera, can be readily distinguished by the coloration of the tail and limbs, in spite of the wide variation in the colours of the body and head. On this basis, and with the difference in the presence or absence of ear-tufts, I would

\* 'Primates,' i. pp. 179-233 (1912).

† “The Genera of Hapalidae,” *Ann. & Mag. Nat. Hist.* (5) xx. p. 247 (1917).

even split the normal-sized species of *Hapale* into two groups, largely on account of the two sharply differentiated forms of coloration found in it, and would also distinguish the Pygmy Marmoset as a special genus.

Thus, apart from *Callimico*, the whole may be classified as follows:—

- A. Lower teeth normal, the canines much longer than the incisors.
- a. Fingers elongated. Tail (at least its upper side) and forearms golden yellow. Skull dolichocephalic. Teeth large ..... 1. *Leontocbus*.  
Species: *chrysomelas* (type), *leominus*, *rosalia*.
  - b. Fingers normal. Skull more brachycephalic. Teeth smaller.
  - a<sup>2</sup>. Tail and forearms uniformly black\*. Face hairy as usual ..... 2. *Mystax*.  
Species: *mystax* (type), *apiculatus*, *bluntschlii*, *chrysopygus*, *devillei*, *flavifrons*, *fuscicollis*, *gracilis*, *griseiventris*, *illigeri*, *imperator*, *labiatus*, *lagonotus*, *leucogenys*, *melanoleucus*, *midas*, *nigricollis*, *nigrifrons*, *pileatus*, *rufimanus*, *rufiventris*, *rufoniger*, *thomasi*, *tripartitus*, *ursulus*, *weddelli*.
  - b'. Forearms and hands white or yellowish. Face, or at least its sides, short-haired or naked.
  - a<sup>3</sup>. Ears of normal length. Tail dark proximally, at least above, lighter terminally. . . . . 3. *Semioebus*.  
Species: *bicolor* (type), *leucopus*, *martinsi*, *meticulosus*.
  - b<sup>3</sup>. Ears short. Tail red proximally, black terminally ..... 4. *Oedipomidas*.  
Species: *oedipus* (type), *geoffroyi*, *saluquiensis*.
- B. Lower teeth modified, the canines little longer than the incisors.
- c. Size about as in other marmosets. Mandible high in proportion to its length, the condylar process upright. *P*<sup>1</sup> with an internal lobe.
  - c<sup>2</sup>. Ears untufted. Tail wholly black. . . . . 5. *Mico*.  
Species: *argentatus* (type), *emiliae*, *leucippe*, *melanurus*.
  - d<sup>2</sup>. Ears with long tufts on or round them. Tail ringed with white or yellowish. . . . . 6. *Hapale*.  
Species: *jacchus* (type), *albicollis*, *aurita*, *chrysoleuca*, *flaviceps*, *humeralifer*, *jordani*, *leucocephala*, *penicillata*, *santaremensis*.
  - d. Size much smaller. Mandible lower in proportion to length; condylar process slanted backwards. *P*<sup>1</sup> without internal lobe. . . . . 7. *Cebuella*.  
Species: *pygmaea* (type).

Three white species, however, whose original derivation may or may not have been due to albinism, will not fall

Hands sometimes yellow, generally black.



readily into this scheme, owing to their abnormal colour. But their positions seem clear enough, viz.:—

*Mico melanoleucus*, Rib., is a *Mystax*.

*Hapale chrysoleuca*, Wagn. (incl. *sericeus*, Gray), is a true *Hapale*.

And the following new species is a *Mico*:—

*Mico leucippe*, sp. n.

Like *Hapale chrysoleuca*, but the ears untufted, nearly naked. Head, fore limbs, body, and hips quite white; lower legs, feet, and tail light golden yellow, not so strong as in *chrysoleuca*.

Teeth with the structure typical of *Hapale*, not of *Mystax*.

Dimensions of the type (measured in the flesh by Fräulein Snethlage):—

Head and body 235 mm.; tail 342; hind foot 64; ear 30.

Skull: greatest length 43·5; basal length 33·8; breadth of brain-case 26·2; maxillary tooth-row 11·8.

*Hab.* Lower Amazons. Type from Pimental, Rio Tapajoz.

*Type.* Adult male. B.M. no. 9. 3. 9. 2. Original number 14. Collected 13th November, 1908, by Fräulein Dr. E. Snethlage. Presented by the authorities of the Museum Goeldi, Para.

This beautiful white marmoset had been supposed to be *Hapale chrysoleuca*, but is readily distinguished by its wholly untufted and almost naked ears. Two specimens were obtained by Fräulein Snethlage, both quite alike.

“Shot in deep forest.”—E. S.

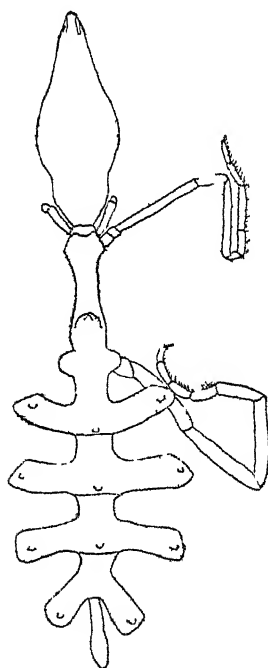
XXI.—*The Holotype of Parazetes auchenicus, Slater (Pycnogonida).* By W. T. CALMAN, D.Sc., F.R.S.

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IN a paper published in this Magazine in 1879 (ser. 5, vol. iii. p. 281), the late Mr. H. H. Slater described a *Pycnogon* from Japan as *Parazetes auchenicus*, gen. et sp. n. He stated that

the proboscis was "distinctly four-cleft at its apex—a peculiarity, as far as I know, hitherto unknown among Pycnogons," and that the palpi consisted of nine segments. Loman, in 1911 (Abh. k. Bayer. Akad. Wiss. München, Suppl. Bd. ii. Abh. 4, p. 6), pointed out, on the evidence of sketches of the holotype which I sent to him, that both these statements were

Fig. 1.



*Ascorhynchus auchenicus* (Slater), holotype, dorsal view. Legs omitted.

wrong, and he identified the genus with the earlier *Ascorhynchus* of Sars and the species with the *Gnamptorhynchus ramipes* of Böhm.

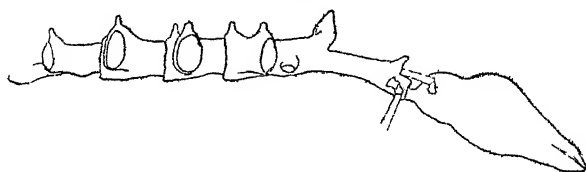
Loman's determination of the genus is certainly correct, but I am not convinced that his identification of the species is so.

*Description.*—The specimen is probably a female, the genital openings on the last two pairs of legs being distinctly

larger than those of an ovigerous male of similar size belonging to an allied species.

*Body* elongated, lateral processes separated by about their own diameter, width across second lateral processes five times

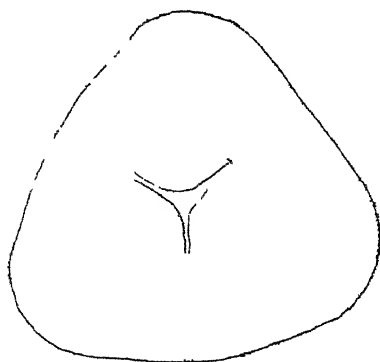
Fig. 2.



*Ascorhynchus auchenicus* (Slater), holotype, from the right side.  
Legs, oviger, and palp omitted.

that measured between first and second. *Cephalon* (from base of proboscis to first lateral processes) little shorter than rest of trunk. Ocular tubercle in front of attachment of ovigers, pointed, eyes well marked. A tubercle in middle

Fig. 3.



*Ascorhynchus auchenicus* (Slater), holotype. Apical view of proboscis, showing mouth-opening.

of hind margin of first three segments, one on each lateral process and a pair over bases of chelophores; these tubercles blunt, hardly taller than wide. *Proboscis* nearly one-third of

total length, fusiform, acutely pointed, and deeply cleft into three lips at tip, with a slight constriction at about one-third of its length from base. *Abdomen* clavate, one-third of length of proboscis.

*Chelophores* one-fifth as long as proboscis, scape undivided, distal segment irregular in form. *Palps* of ten segments. *Legs* with first and third coxæ equal, second longer by one-half, first coxa with two distal tubercles or very short spurs, second with one tubercle beyond middle of its length. First legs with well-marked but very short claw, second tibia a little shorter than femur, tarsus about one-third of femur and longer than propodus. Posterior legs with second tibia shorter than femur, tarsus equal to propodus, claw about one-third of propodus.

*Measurements* (in millimetres) :—

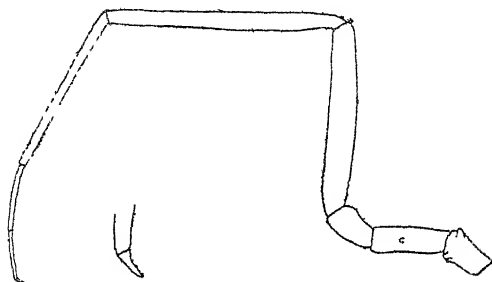
Length of proboscis .....	3.48
Greatest diameter of proboscis .. . . .	1.6
Length of trunk .....	6.24
Length of cephalon .....	3.04
Width across second lateral process .....	3.2
Width between first and second lateral processes ..	0.6
Length of abdomen .....	1.2

	First left leg.	Third left leg.
First coxa .....	0.72	0.8
Second coxa .....	1.2	1.2
Third coxa .....	0.8	0.8
Femur .....	3.28	3.0
First tibia .. . . .	4.32	4.0
Second tibia .....	3.12	2.72
Tarsus .....	1.16	1.0
Propodus .....	0.92	1.04
Claw .....	0.12	0.36

*Remarks.*—Loman, identifying Slater's species with *A. ramipes* (Böhm), places in the same synonymy *A. bicornis*, Ortmann, regarding as unimportant the differences said to distinguish the last-named species, but not discussing them in detail. Ortmann states that *A. bicornis* has a claw on the first legs and the abdomen only half as long as the proboscis, while *A. ramipes* has no claw on the first legs and the abdomen equal to the proboscis. In the present specimen the abdomen is about one-third as long as the proboscis and the other characters are as given by Ortmann. Böhm's figure and description of *A. ramipes* present some inconsistencies, but Ortmann confirms his account of the very long abdomen and the clawless first legs.

Loman does not mention in this connexion *A. minutus*, Hoek, from which Ortmann distinguishes *A. bicornis* because (among other less important characters) the former is said to have an unpaired spine or tubercle at the base of the chelophores. The two type-specimens of Hoek's species, however, have clearly a pair of tubercles in that position (as Loman found also in a specimen referred to this species from the 'Siboga' Expedition), and I cannot find any characters by which it would appear safe to separate it from *A. bicornis*.

Fig. 4.



*Ascorhynchus auchenicus* (Slater), holotype. First leg of left side (first and second coxæ from above, distal segments from behind), with enlarged figure of terminal claw.

While agreeing with Loman that the tubercles or processes on the body and on the coxæ of the legs may vary widely in degree of development, I propose to restrict the name *A. ramipes* (Böhm) to specimens having no claw on the first legs and the abdomen about as long as the proboscis, and to apply the name *A. auchenicus* (Slater) to forms which have a claw on the first legs and the abdomen not more than half as long as the proboscis. The following synonymy is suggested:—

*Ascorhynchus auchenicus* (Slater).

*Parazetes auchenicus*, Slater, Ann. & Mag. Nat. Hist. (5) iii. 1879, p. 281.

*Ascorhynchus minutus*, Hoek, Rep. Pycnogonida 'Challenger,' 1881, p. 55, pl. vi. figs. 10-16; Loman, Pantopoden der 'Siboga' Exped. 1908, p. 33.

*Ascorhynchus bicornis*, Ortmann, Zool. Jahrb. Syst. v. 1890, p. 162.

*Ascorhynchus ramipes* (part.), Loman, Abh. k. Bayer. Akad. Wiss. München, Suppl. Bd. ii. 1911, Abh. 4, p. 6.

XXII.—*Note on a Bear (Ursus savini, sp. n.) from the Cromer Forest-bed.* By C. W. ANDREWS, D.Sc., F.R.S. (British Museum, Natural History).

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THE occurrence of the remains of bears in the Norfolk Forest-bed series has long been known. In 1846 Owen, in his 'British Fossil Mammals and Birds,' described the mandible of a large bear from high up in the series at Bacton, and referred it to *Ursus spelæus*. This specimen, which was in the Green Collection, is now in the British Museum (16448). Numerous authors have since written upon the subject, and a summary of their various views is given by E. T. Newton in his 'Vertebrata of the Fossil Bed Series of Norfolk and Suffolk' (1882), p. 5. Here he points out that the Forest-bed bears have been referred to four species—*Ursus spelæus*, *U. arvernensis*, *U. etruscus*, and *U. priscus*,—but that, except in the case of the first-named species, there is no published record of the material upon which these determinations were based.

Mr. Newton himself was able to examine some fifteen specimens, mostly lower jaws, and, with three exceptions, he refers all these to *Ursus spelæus*. The exceptions are a maxilla which he regards with some certainty as belonging to *Ursus ferax-fossilis* (= *U. priscus* = *U. horribilis*). This specimen, which is labelled "*U. priscus*" in Falconer's handwriting, is figured by Newton (*op. cit.* pl. i. fig. 5). It seems just possible that it may belong to the ordinary Forest-bed Bear. The other specimens referred doubtfully to *Ursus ferax-fossilis* are a left ulna and a second metacarpal.

Having recently had occasion to examine most of the bear-remains in the British Museum, I paid particular attention to the Forest-bed bear, because it always seemed improbable that a Pliocene form should be identical with a late Pleistocene species, the associate of *Elephas primigenius* and *Rhinoceros antiquitatis*. The material upon which the conclusions here arrived at are based includes not only the specimens described by Mr. Newton and those belonging to the Savin Collection in the British Museum, but also a quantity of bear-remains collected in recent years by Mr. Savin, of Cromer, and now kindly lent by him for the purposes of this paper.

The material now available for examination includes about

sixteen mandibular rami of varying degrees of completeness, two maxillæ with molars, numerous odd teeth, and a number of more or less perfect limb-bones. The result of my examination of these remains is that I have come to the conclusion that the common bear of the Cromer Forest-bed is specifically distinct from the typical *Ursus spelæus*, though it certainly belongs to the same (Spelæarctine) group, and may, perhaps, represent the ancestral form. I suggest that this new species should be called *Ursus savini*, sp. n., in honour of Mr. Savin of Cromer, whose untiring zeal in collecting the Forest-bed fossils is well known.

I propose to take as the type-specimen the right mandibular ramus (16448) from Bacton described and figured by Owen in 'British Fossil Mammals and Birds' (1846), p. 89, fig. 35 c (p. 106); also by E. T. Newton in 'Vertebrata of the Forest-bed Series' (1882), pl. i. figs. 1, 1 a. The fourth premolar is also figured by Reynolds in 'British Pleistocene Mammalia' (Mon. Pal. Soc. 1906), pl. vi. fig. 6 c.

The dimensions of this specimen (in millimetres) are:—

Length of jaw .....	260
Depth of jaw between $m_2$ and $m_1$ .....	57
Height at coronoid process .....	112
Length of diastema.....	app. 37
$M_3$ , length 24, width 16.	
$M_2$ , " 25, " 16.	
$M_1$ , " 25, " 12.	
$Pm_1$ , " 16, " 10.	
Length of molar series ( $M_1-M_3$ ) .....	75
Length from $m_3$ to canine .....	app. 125
Canine: long diameter of base of crown .....	25
" short " " " .....	17

It is not denied that *U. savini*, though smaller, resembles *U. spelæus* in some important points—*e. g.*, (1) in the loss of the anterior premolars (in one case  $pm_1$  is present); (2) in the tendency towards the complication of the crown of  $pm_4$  by the development of an inner cusp, which, however, is by no means always present; (3) in the complication of the crowns of the molars through the development of numerous accessory tubercles. On the other hand, it differs in (1) the relatively smaller size of the check-teeth in proportion to the jaw; (2) in the shorter diastema between  $pm_4$  and the canine; (3) in the more slender form of the latter tooth, especially in the region of its root; (4) the smaller size of the posterior lobe of the last lower molar compared to the anterior lobe.

The degree of complication of  $pm_4$  is very variable; in

some specimens the inner cusp is not much developed, as in the tooth from Bacton (16448) figured by Reynolds (pl. vi. fig. 6 c), and still less in another specimen (M 6190) from Sidestrand; on the other hand, in a specimen (M 5995) figured by Reynolds on the plate just quoted (fig. 6 a), the complication is much greater, but in no case does it approach that seen in the normal  $pm_4$  of the Pleistocene *Ursus spelæus*.

In both *Ursus spelæus* and *U. savini* the mandibular rami of some old individuals, probably males, may become much deepened beneath the posterior molars. This is especially marked in one very massive mandibular ramus (M 6186) from Bacton; in this case, however, this peculiarity may have been partly due to a diseased condition. This deepening of the posterior part of the mandibular ramus is well shown in a specimen from Overstrand (Savin Coll. M 6079) figured by E. T. Newton (*op. cit.* pl. i. fig. 3). In younger individuals, particularly in the smaller, probably female, jaws, the lower border of the ramus is nearly straight.

Another bear with which *Ursus savini* must be compared is *U. deningeri* from the older Pleistocene sands of Mosbach and Mauer. This species has been described in great detail by v. Reichenau [Abhandl. Geol. Landesanstalt Darmstadt, Bd. iv. (1901-8) p. 208], and its relationships to other species, especially to the Forest-bed bears and *U. spelæus*, have been discussed by Freudenberg [Palæon. Abhandl. Bd. xvi. (1913-14) p. 582]. The latter author, though at first inclined to regard *U. deningeri* as identical with the common Forest-bed species (*U. savini*), later in his paper states that it is really different in several respects. The chief differences are:—(1) in *U. deningeri*  $pm_4$  is always a narrow cone without the inner tubercle, which is often more or less developed in *U. savini*; (2) in *U. savini* the third lower molar, though similar in general outline, is broader in proportion to its length, a peculiarity still more marked in  $m_2$ - $pm_4$ . In one specimen of *Ursus deningeri*  $pm_3$  is present.

From his table of average measurements of the teeth in *U. savini*, *U. deningeri*, and *U. spelæus*, Freudenberg believes that *U. savini* is intermediate between *U. spelæus* and *U. deningeri*; but the more extensive series of measurements now available shows that, so far as the dimensions of the teeth go, *U. deningeri* and *U. savini* are very similar. Nevertheless, the differences in structure already referred to and the difference of date seem to justify the separation of the two forms



here adopted. Freudenberg considers that probably both *U. deningeri* and *U. savini* are derived from *U. ctuscus* or some related form, and that *U. savini* may be the ancestor of *U. spelæus*.

Among the specimens lent by Mr. Savin there is also a right maxilla of a small bear which is of great interest. The canine,  $pm^4$ ,  $m^1$ , and  $m^2$  are present, and the socket for a small  $pm^3$ . It is peculiar for the great depth of the maxilla between the antorbital foramen and the cheek-teeth, and the animal must have had a very short deep muzzle. It is much too small to fit any of the mandibles preserved, but at the same time the teeth show the complex tuberculation characteristic of the Spelæarctine group, so that it may indicate the existence of very small individuals of *U. savini*. The teeth are quite unlike those of *U. arvernensis*.

The dimensions of the teeth in this specimen (in millimetres) are:—

Canine, length at base of crown 18, width at base of crown 15.

$Pm^1$ , length 17, width 12.

$M^1$ , " 25, " 17.

$M^2$ , " 36.5, " 18.

Too much importance must not be attached to this specimen, as it seems to be much restored; but if it actually belongs to a small *Ursus savini*, it indicates that that animal had a deep skull with a short muzzle, which agrees with the short diastema in the mandible.

A number of limb-bones are preserved: these, especially the tibia, indicate that this species was a heavily built short-legged animal. In *Ursus spelæus* also the limbs are relatively short.

A left maxilla of a very large bear is included among the specimens lent by Mr. Savin (no. 745, Overstrand). The two molars are well preserved, but somewhat worn; these dimensions are:  $m^1$ , length 30 mm., width 21;  $m^2$ , length 50 mm., width 23.5. The posterior lobe of  $m_2$  is remarkably long and narrow; the tuberculation of the crowns of the molars seems to have been less complex than usual in *Ursus spelæus*. It is just possible that this maxilla may belong to a very large individual of *U. savini*, but it is far too large to be associated with any of the mandibles in the Collection; possibly it belongs to the bear referred to by Newton as *Ursus ferox-fossilis* (?). More material is necessary before any certain determination is possible.

XXIII.—*Notes on Myriapoda*.—XXVII. *Wandering Millipedes*. By the Rev. S. GRAHAM BRADE-BIRKS, M.Sc. (Manchester), Lecturer in Zoology and Geology, South-Eastern Agricultural College (University of London), Wye, Kent.

#### INTRODUCTORY.

There are published records of a number of observations upon wandering millipedes.

In a paper cited by Verhoeff (1900), J. Paszylavszky (1879) published an account of a migration of *Brachyiulus unilineatus* in the Hungarian Alföld, and made reference to observations by Tömösváry on a case in Transylvania ('Természettudományi Közlöny,' x. p. 365) and to a remark by Taschenberg with reference to the appearance in mass of "*Julus guttulatus* Fabr." Concerning Tömösváry's observations, he says:—"In grösster Anzahl war *Julus terrestris* L., *J. fasciatus* Koch und *J. trilineatus* Koch vertreten; jedoch die beiden letzteren und *J. unilineatus* waren viel spärlicher als die erstgenannten. Ausserdem war noch eine bis jetzt nicht bestimmte *Julus*- oder *Allajulus*-Art, dann *Lithobius*, einige *Geophilus* und *Linnotenia*." With regard to the names used in this passage I will do no more than point out that the last is obviously meant for *Linotenia*, and say that I have not tried to make out what animals are really intended by the names of millipedes used in it. In her report for 1885 Miss Ormerod, (1886) p. 48, recorded "the migration of" Julids "in large numbers from one locality to another." They were "apparently travelling across from a field of Oats towards a piece of pasture land." This event was described on the 31st May as "A few mornings since," and was reported from Rise Hall, Fakenham. Two years later Bollman (1888) referred to movements of *Fontaria virginensis* (Drury) at Donaldson, Arkansas. Paszylavszky's (1879) account was criticized by Verhoeff (1900) in publishing an account of a wandering in Alsace of *Schizophyllum sabulosum* (Linné), the specimens examined being referable to the var. *bifasciatum* in both sexes, and just a small number of males to the var. *punctulatum*. In the collection made on this occasion there were two specimens of *Cylindroiulus londinensis*, var. *cæruleocinctus* (Wood), but Verhoeff considered those to be accidentally present. Mauck (1901) gave an account of the swarming of *Fontaria virginensis* near the

Indiana University Biological Station at Vawter Park. Sinclair (1904), in addition to references to two of the cases cited above, adds an instance, with which the writer is otherwise unfamiliar, from Verhoeff; this concerns *Brachydesmus superus*, "which," says Sinclair, "live in dry seasons beneath the earth and in rainy weather are found above the ground: in the latter case they make short migrations."

## NEW RECORDS.

### *Movements of Millipedes at Night.*

At Wye, Kent, in 1921, I was fortunate in being able to make first-hand observations over a period of several months. On 6th April, between 8 and 9 P.M., G.M.T., I was walking with a colleague, Mr. C. A. W. Duffield, along a road close to the town (Coldharbour Road), when, by the light of the lamp carried, a number of millipedes was seen in the roadway. On many subsequent nights during the months of April, May, and June, I searched the same road, and repeatedly found millipedes. Twice in July (19 and 20) when I searched I found none. In the course of three months the following animals were obtained in this way:—

*Tachypodoiulus niger* (Leach).

*Cylindroiulus londinensis*, var. *cæruleocinctus* (Wood).

*Iulus* (*Micropodoiulus*) *scandinavicus*, Latzel.

*Ophiulus pilosus* (Newport).

*Schizophyllum subulosum* (Linné).

*Stosutea italica* (Latzel) [now first recorded for Britain; see remark at the end of this note].

*Polydesmus* sp.

I believe that the millipedes observed on this road were mostly individuals of the first two forms mentioned in the list just above. Support is given to this view by the fact that on the first two nights of observation—nights when large numbers were observed—complete diagnosis of the animals collected showed that there had been obtained 24 *T. niger*, 1 *C. londinensis*, var. *cæruleocinctus*, 1 *Polydesmus* sp., in a distance of about 240 yards on 6. 4. 21, and 70 *T. niger*, 11 *C. londinensis*, var. *cæruleocinctus*, 1 or 2 *I. scandinavicus*, and 1 *Polydesmus* sp. in a distance of about 530 yards on 7. 4. 21 (both distances are but roughly determined).

Elsewhere in the same district millipedes have also been taken at night on roadway and footpath. I have repeatedly taken *Brachyiulus pusillus* (Leach) at night on the sides of horticultural frames in the Wye College kitchen-gardens, and have concluded that they were feeding either upon cryptogamic material or upon any decaying wood that might be found there.

Although 1921 was abnormally dry, it does not seem likely that this is sufficient to explain all the instances observed during the year. It seems likely that large numbers of millipedes wander by night at certain seasons every year, and that at these times our less-frequented country roads, our lanes, and field-footpaths provide good observation grounds. It is perhaps worth adding that a dead Julid was found on Coldharbour Road one day in the middle of May 1920, so that, had a night search been made then, wanderers were probably to be taken—perhaps the one that was found was killed by a passing vehicle.

#### *Movements of Millipedes by Day.*

Mr. Harriss, fruit-foreman to the Ditton Court Farm, Ltd., Larkfield, Kent, and other workers noticed about six specimens of a millipede agreeing in Mr. Harriss's description with *Cylindroiulus londonensis*, var. *cæruleocinctus* (Wood), which occurs locally, or some other animal of similar appearance, "crossing" a road between a field on Ditton Court Farm and a potato-field in the occupation of the East Malling Experimental Station. The animals were observed about 4.30 P.M., G.M.T., on an afternoon about the middle of September 1920. The 1920 crop on the field the millipedes appeared to be leaving consisted of cabbages and spring-oats. The road is not bounded on either side by a fence of any kind, and the length on which these animals were observed was some 60 yards.

On 12th May, 1921, about 9 A.M., G.M.T., the writer took one male of *Ophiyulus pilosus* (Newport) and one female of *Tachypodoiulus niger* (Leach) alive on the roadway of Coldharbour Road, Wye, Kent. It was a thunder-like morning, and the sun was struggling through a haze.

Mr. R. Standen was kind enough to amplify for me *in litt.* his account of an incident just mentioned in one of his papers (Standen, 1921). "Passing," he says, "through Dove Dale, Derbyshire, one dull, sultry day in June 1919, immediately after a heavy rainfall following a dry spell of weather, I was

amazed at the number of Woodlice, Myriapods, Mollusks, and other small nocturnal animals which the exceptional meteorological conditions had brought out at mid-day. The stones on the 'screes,' the wet faces of the rocks, and tree-trunks, absolutely swarmed with them. I sat down before a sloping rock about two yards square and tried to count the Woodlice, etc., but had to give up the task. The rock-face was almost covered with tiny Lichens, Moss, and Liverwort, amongst which I counted fourteen fine examples of the beautiful *Schizophyllum sabulosum* slowly meandering, reminding me strongly of young Blindworms (*Anguis fragilis*) in their coloration and movements. Watching these very closely through a lens I found that they were feeding on the Liverwort. . . . In the same space I also noted five *Glomeris marginata*; seven *Tachypodoiulus niger*. . . ."

#### ECONOMIC STANDPOINT AND FUTURE INVESTIGATION.

It was evidently realized long ago that a knowledge of the wandering of millipedes might be of some importance to the economic zoologist, for Miss Ormerod (1895), p. 81, says "it seems to me we need special investigation as to the possibilities of migration."

Facts which have come to the writer's notice, and just recorded above, throw some light upon the subject, and he hopes that further progress towards a solution of the problems involved may be made by the co-operation of other workers during 1922. The pursuit of other researches have, so far, made it impossible to devote the time it would require to a full investigation of the matter.

It would be advantageous to have observations nightly—say, one hour after sunset—on measured stretches of road, and to have records made of the numbers of millipedes collected, their species, sex, and ontogenetic stage; thus each specimen should be preserved for examination and identification, and the number of pairs of legs should be counted and each animal measured. Weather conditions should also be taken into account.

It would also be a good thing if it could be definitely determined whether individuals travel any great distance.

#### THE OCCURRENCE OF *STOSATEA ITALICA* (LATZEL).

I had taken this animal sparingly in the Vicarage garden at Wye in 1920. In 1921 Mr. Bagnall found it in considerable numbers among decaying vegetable matter on the

roadside near Coldharbour Farm, Wye. M. Henry W. Bülemann was kind enough to identify the species for me in the first instance, and I tender him my best thanks.

The original description was as *Strongylosoma italicum*, Latzel, 1886, Bull. Ent. Ital. xviii. p. 308.

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6th January, 1922.

#### XXIV.—*A Preliminary Note on some new Nematode Parasites from the Elephant.* By M. KHALIL, M.D., D.P.H., D.T.M. & H.\*

PTERIDOPHARYNX, Lane, 1921.

*Pteridopharynx anisa*, sp. n.

Male is 14-15 mm. long and 0.46 mm. in breadth.

Female is 16.5-17 mm. in length and .65 mm. in breadth.

Cuticle is striated. External leaf-crown consists of about 20 leaflets. There are 4 head-papillæ. Mouth-capsule pear-shaped. Oesophagus is .45-.57 mm. in length. The

\* From the Helminthological Department, London School of Tropical Medicine. Received for publication 9th January, 1922.

nerve-ring is .25 mm. from head-end. Bursa has a very long dorsal lobe indistinctly separated from the lateral lobes. Dorsal ray divides into two. The dorso-lateral ray is bifid near its end. The two spicules are equal, .82 mm. long, curved near the tip. Accessory piece is .13 mm. The female tail is .52 mm. The vulva is placed .12 mm. in front of the anus.

*Hab.* Intestine of the African elephant, Uganda.

MEMPHISIA, gen. nov.

Slender Nematodes with a ring-shaped mouth-capsule. Mouth-opening surrounded by a leaf-crown. There is a cuticular expansion just below the head forming a ring. Bursa elongated and divided into three lobes. The middle lobe is longer than the lateral lobes. The dorsal ray divides into two. The dorso-lateral ray gives a small branch about its middle nearly at right angles to its course.

Type-species, *Memphisia memphisia*.

*Memphisia memphisia*, sp. n.

Male is 13.5-14 mm. long and .55 mm. in breadth.

Female is 14.5-16 mm. long and .55 mm. in breadth.

Cuticle is striated. The cuticular collar is large. There are 4 head-papillæ. External leaf-crown consists of about 17 leaflets. The mouth-capsule is broader than it is long. Œsophagus is broad and short, .48 mm. in length. Nerve-ring is .25 mm. from head. Bursa is shorter than in the next species. The two spicules are slender, bent dorsally at end. They are .9 mm. in length. Accessory piece is .1 mm. in length. The tail of the female tapers sharply. It is .58 mm. in length. The vulva lies close in front of the anus.

*Hab.* Intestine of African elephant, Uganda.

*Memphisia aziza*, sp. n.

Male is 12 mm. in length and .5 mm. in breadth.

Female is 15 mm. in length and .5 mm. in breadth.

Cuticle is striated. There are 4 head-papillæ. External leaf-crown consists of 20 leaflets. Mouth-capsule is longer than it is broad. Œsophagus is short and broad, and is .4 mm. in length. The nerve-ring is placed .2 mm. from the head. The bursa is longer than that of *M. memphisia*. The

two spicules are .75 mm. in length. Accessory piece is .1 mm. in length. The tail of the female is .66 mm. The vulva is .25 mm. in front of the anus.

*Hab.* Intestine of African elephant, Uganda.

MURSHIDIA, Lane, 1914.

*Murshidia hadia*, sp. n.

Male is 18.5 mm. in length and .67 mm. in breadth.

Female is 24 mm. in length and .82 mm. in breadth.

Cuticle is striated. There are 4 head-papillæ and an external leaf-crown consisting of about 40 rays. Mouth-capsule is globular. Œsophagus is .85 mm. in length. The nerve-ring is placed .6 mm. from the head-end. The bursa is short and broad. The rays have irregular prominences at their origin. The dorsal ray divides into 6 branches nearly equal in length. The spicules are equal and stout. The tip is rounded and bent dorsally. They are 1.1 mm. in length. The female tail is slender and is 2.25 mm. in length. The vulva is placed .6 mm. in front of the anus.

*Hab.* Intestine of African elephant, Uganda.

QUILONIA, Lane, 1914.

*Quilonia uganda*, sp. n.

Male 11.5-12 mm. in length and .55 mm. in breadth.

Female 16 mm. in length and .64 mm. in breadth.

Cuticle is striated. There are four head-papillæ. The external half-crown consists of 12 leaflets. Mouth-capsule is shallow with two teeth at its floor. Œsophagus is .52 mm. to .62 mm. in length. Bursa is short and indistinctly divided into three lobes. The dorsal ray is slender and divides into two divisions, each of which ends in three fine rays unlike those of *Q. africana*. The spicules are equal and .72 mm. in length. Accessory piece is .1 mm. in length. Tail of female is 2.43 mm. in length, and the vulva is placed 2.77 mm. in front of the anus.

This species differs from *Q. apiensis*, Gedoclst, 1916, principally in the length of the spicules. In *Q. apiensis* they are .944 mm. in length.

*Hab.* Intestine of African elephant, Uganda.



*LEIPERENIA*, gen. nov.

Minute nematode just visible to the naked eye. Head surrounded by more than six small lips. Mouth-capsule is absent. There is a short muscular pharynx placed on top of an elongated thin oesophagus. Tail is simple, non-bursate. The male has two unequal spicules and an accessory piece. Female is viviparous. Embryos reach an advanced stage of maturity within the parent worm. There is a cuticular expansion round the anterior part of the body. Cuticle is striated.

Type-species, *L. leiperi*, from the African elephant.

*Leiperenia leiperi*, sp. n.

Male is 3·8 mm. long and ·2 mm. in breadth.

Female is 3·9 mm. in length and ·21 mm. in breadth.

It has the character of the genus. There are about 8 conical processes projecting from the anterior end of the pharynx. Pharynx is ·083 mm. long and ·06 mm. in breadth. Oesophagus is ·38 mm. in length. Excretory vesicle is large, and its opening is surrounded by striated margin. The long spicule of the male is ·3 mm. and the short is ·19 mm. The accessory piece is ·09 mm. The tail of the male is ·38 mm. The tail of the female is ·7 mm. and tapers to a sharp point. Vulva is placed a little distance in front of the anus.

*Hab.* The intestine of the African elephant, Uganda.

*Leiperenia galebi*, sp. n.

Male is 3·25 mm. in length and ·17 mm. in breadth.

Female is 3·8 mm. in length and ·18 mm. in breadth.

The pharynx is ·14 mm. in length and ·1 mm. in breadth, and carries about 8 conical processes on its top. Oesophagus is long and thin, ·4 mm. in length. Excretory pore is large and has striated margin, and is placed 1·2 mm. from the head. The long spicule measures ·25 mm., the short one ·13 mm., and the accessory piece ·13 mm. The tail of the male is ·43 mm., and is blunt at the end. The tail of the female is much shorter than in the above species, and is ·53 mm. in length. The vulva is placed a short distance in front of the anus.

*Hab.* Intestine of the Indian elephant.

The material on which this communication is based was collected by Professor R. T. Leiper in Uganda in 1907, when he was a member of the Egyptian Government Expedition. They were kindly submitted to me for examination by him. The last species was collected from an Indian elephant that died in the London Zoological Gardens.

This communication will be followed later by a detailed description with diagrams.

## MISCELLANEOUS.

### *The 'Zoological Record.'*

*To the Editors of the 'Annals and Magazine of Natural History.'*

DEAR SIRS,—I should be glad if you would draw the attention of your readers to the present position of the 'Zoological Record.'

Owing to the collapse of the International Catalogue of Scientific Literature, in connection with which the 'Record' was published from 1906 to 1914, the Zoological Society of London has undertaken to bear the whole financial responsibility for the preparation and printing of the 'Record.'

Owing to the great increase of the cost of printing and to the very meagre support accorded to the 'Record' by zoologists and zoological institutes generally, the financial burden of this undertaking on the Zoological Society is becoming very severe. The cost of printing the 'Record' now amounts to between £1500 and £2000 annually, and the Society receives back by subscribers and sales less than 25 per cent. of this sum; I fear, therefore, unless zoologists are prepared to make greater efforts to support the undertaking, there is a strong possibility that the Council of the Zoological Society may refuse to find this large sum each year.

It appears, therefore, to be the duty of every zoologist to help, so far as he is able, to support this most invaluable work. All particulars and forms of subscription can be obtained from the Secretary of the Zoological Society, Regent's Park, London, N.W. 8; but I may mention that the price of the whole volume is now £2 10s., and the price of the separate parts a proportional smaller sum.

Yours faithfully,

W. L. SCLATER,

Editor 'Zoological Record.'

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XXV.—*The African Species of Ebæus, Er., with an Account of their accessory ♂-characters [Coleoptera].* By G. C. CHAMPION, F.Z.S.

THE present paper, in continuation of the one on *Hedybius* and its allies published in the last volume of this Magazine (pp. 449–494), is based upon a study of the African *Ebæi* belonging to the Cape Town and Durban Museums and the British Museum in London. With two exceptions, they are all from South or East Africa, and about half of them are treated as new, the remainder having been described by Boheman, J. Thomson, Abeille de Perrin, Gorham, and Pic, and placed by them under various generic names\*.

EBÆUS.

*Ebæus*, Erichson, Entomographien, p. 113 (1840) [type *E. pedicularius*, Schrank].

*Urodactylus*, J. Thomson, Archives Ent. ii. p. 80 (1858) [type *U. bicaudatus*, Thoms.].

*Attalus*, Er., subgen. *Miris*, Abeille de Perrin, Rev. d'Ent. ix. p. 51 (1890); Ann. Soc. Ent. Fr. 1890, p. 407 (1891) [type *Ebæus hystrix*, Ab.].

\* The East African forms, one of which is referred to *Ebæus*, named by Pic in 1919, "pour prendre date," are not recognisable from the brief diagnoses given. *Anthocomus coriaceus*, Gorh. (1905), is a Dasytid.

*Ebæomorphus*, Pic, L'Echange, xx. p. 28 (1904) [nec *Attalus*, subgen.  
*Ebæomorphus*, Abeille de Perrin, Ann. Soc. Ent. Fr. 1890, p. 578  
 (1891)] [type *E. ramicornis*, Pic].

The Ethiopian insects here referred to *Ebæus* differ from their northern allies in the armature or shape of the apices of the elytra in the ♂; the appendages when fully developed (*E. bicaudatus*) are not like those of the type of the genus (*E. pedicularius*, Schrank), and when absent (*E. inermipennis*, Pic, &c.) are replaced by a tumid, smooth, or hollow space. In *Ebæus*, s. str., ♂, there are two appendages—a small inner one and a large subtriangular, ear-shaped, or oblong, apical or outer one, the latter retractile and partially closing the terminal cavity. This structure is not to be found in the southern forms, nevertheless the name *Urodactylus*, J. Thoms. (= *Mixis*, Ab.), cannot be retained for them. Abeille de Perrin attached too much importance to the surface-vestiture—wholly fine and sericeous in *Ebæus*, and with intermixed longer hairs or erect setæ in *Mixis*, a character that cannot be regarded as of generic value. The flabellate or pectinate antennæ in the ♂ (*E. ramicornis*, Boh., *apricus*, Gorh., &c.) is an unimportant secondary sexual character occurring also in *Malachius* and *Hapalochrus*. *Ebæus* therefore, in the wide sense, is separable from *Attalus*, which has similar anterior tarsi in ♂, by the appendiculate or peculiarly-formed apices of the elytra in this sex, the head wanting the frontal excavation so conspicuous in the males of *Hebybius*, &c. The simple tarsal structure of *Anthocomus* distinguishes that genus from *Attalus* and *Ebæus*.

## ♂ ♂

- |         |  |            |
|---------|--|------------|
| 1 (14). | Antennæ serrate or subserrate, the joints obconic in No. 19.   |            |
| 2 (7).  | Prothorax narrowly margined; elytra with fine sericeous pubescence, opaque or sub-opaque, the apices excavate and also lamellate or dentate; anterior tarsal joint 2 nigro-pectinate at tip. [ <i>EBÆUS</i> , Fr.] |            |
| 3 (6).  | Elytra metallic.   |            |
| 4 (5).  | Legs, head, prothorax, scutellum, &c., testaceous  | Species 1. |
| 5 (4).  | Legs, head, prothorax in part, and scutellum metallic  | Species 2. |

\* ♀♀ only known of Nos. 14, 23–30, 33: these species are not included in the Table.

- 6 (3). Elytra maculate, at least at tip, not metallic; legs infusate, except in No. 6 . . . . . Species 3-6.
- 7 (2). Prothorax more broadly margined; elytra usually with longer bristly or erect hairs intermixed, maculate.
- 8 (11). Elytral apices transversely excavate and each with a long, curved or angulate appendage arising from the suture [URODACYLUS, J Thoms. = MIXIS, Ab]
- 9 (10). Anterior tarsal joint 2 elongated, nigro-pectinate at apex and along outer edge; posterior tibiæ simply curved . . . . . Species 7-9.
- 10 (9). Anterior tarsal joint 2 nigro-pectinate at apex only; posterior tibiæ bisinuate in No. 10, dilated near base in No. 11. . . . . Species 10-17.
- 11 (8). Elytral apices transversely depressed or excavate, and also lamellate, tumid, or subdentate.
- 12 (13). Anterior tarsal joint 2 elongated, nigro-pectinate at apex and along outer edge; intermediate tibiæ tumid near base and strongly sinuate in No. 19. . . . . Species 18-20.
- 13 (12). Anterior tarsal joint 2 nigro-pectinate at apex only; intermediate tibiæ sinuate in No. 21. . . . . Species 21, 22.
- 14 (1). Antennæ sharply dentate, pectinate, or flabellate; elytral apices more or less excavate, and also tumid, lamellate, or dentate, simply smoother and obliquely truncate in No. 36; elytra with longer hairs intermixed. [NEPACHYS, G. Thoms.; EBÆOMORPHUS, Pic, *nec* Ab.]
- 15 (16). Elytra metallic (except at tip in No. 32), opaque or shining; antennæ dentate and posterior tibiæ bisinuate in No. 31, the antennæ pectinate in No. 32; anterior tarsal joint 2 nigro-pectinate at apex . . . . . Species 31, 32.
- 16 (15). Elytra (except in No. 34, var.) maculate; anterior tarsal joint 2 nigro-pectinate at tip and along outer edge . . . . . Species 34-36.

1. *Ebæus conigerus*, sp. n.

♂. Moderately elongate, convex, widened posteriorly, the elytra opaque, the rest of the surface shining, very finely sericeo-pubescent; rufo-testaceous, the antennal joints 7-11 in great part, and the eyes, black, the elytra purplish-violaceous, blue at the base; the head and prothorax almost smooth, the elytra alutaceous, excessively minutely punctate. Head longitudinally bi-impressed in front; antennæ long, rather stout, serrate. Prothorax convex, transverse, rounded at the sides, strongly, obliquely narrowed posteriorly, very narrowly margined. Elytra moderately

long, rounded at the sides posteriorly; sinuate-truncate and deeply, abruptly, transversely excavate at the apex, the excavation limited externally by a long, stout, inferiorly-hollowed, conical prominence, the sutural angle also raised and angulate. Posterior tibiae curved. Anterior tarsal joint 2 projecting over the base of 3, black at the tip.

Length 3 mm.

*Hab.* RHODESIA, Salisbury (*Dr. Marshall*: x. 1899).

One specimen. A rufo-testaceous insect, with opaque, purplish-violaceous elytra, the latter strongly bidentate at the apex in ♂, the five outer joints of the antennae partly or wholly black. *E. (Mixis) rufithorax*, Pic, ♂, has a similar, but shorter, conical tubercle at the outer apical angle of the elytra. The outer tubercle in *E. conigerus* is hook-like when viewed in profile.

## 2. *Ebaeus nairobiensis*, sp. n.

♂. Elongate, widened posteriorly, very finely pubescent, the head and prothorax very shining, the elytra (except at the base) opaque; obscure metallic green, the sides of the prothorax broadly, and the abdomen (the black tip excepted), rufo-testaceous, the antennal joints 1-4 (except 1 above), and the anterior tarsi at the base, testaceous, the rest of the antennae black. Head barely as wide as the prothorax, almost smooth, bi-impressed in front; antennae long, serrate. Prothorax transverse, convex, almost smooth, rounded at the sides, narrowed posteriorly. Elytra incompletely covering the abdomen, very finely shagreened and with an indication of two faint raised lines on the disc; constricted and sinuate-truncate at the apex, deeply, transversely excavate before the tip, the excavation polished within and bordered on each side behind by a rather broad, tumid, projecting lamella. Anterior tarsal joint 2 extending over the base of 3.

Length  $3\frac{1}{2}$  mm.

*Hab.* E. AFRICA, Ngong Forest, Nairobi (*A. F. J. Gedyé*: 18. x. 1920).

One ♂, presented to the British Museum. More elongate and larger than the S. African *E. ramicornis*, Boh., the elytra wholly metallic, the abdomen red, except at the tip, the antennae simply serrate in ♂.

3. *Ebæus rubricatus*, sp. n.

♂. Elongate, widened posteriorly, the elytra opaque, the rest of the surface somewhat shining, finely sericeo-pubescent; black, the antennal joints 1-5 (except 1 above) and 11 in part, the sides of the prothorax broadly, and the elytra (a common oblong spot on the suture before the tip excepted) testaceous; extremely finely, closely punctate. Head, antennæ, thorax, and elytra as in *E. martini* and *dunbrodensis*, Pic; elytra transversely excavate before the tip, the apical margin tumid and subangulate externally, and with a narrow, rather long, blunt process arising from each sutural angle; anterior tarsal joint 2 extending over 3 above.

Length 3 mm.

*Hab.* E. AFRICA, Port Natal [Durban] (*ex coll. Fry*).

One male. This is one of four closely-related S. African insects, separable, *inter se*, apart from colour-differences, by the shape of the apices of the elytra in ♂. The structure of the anterior tarsi in this sex excludes them from *Anthocomus*.

4. *Ebæus martini*.

*Anthocomus martini* and var. *natalensis*, Pic, L'Echange, xx. p. 27 (♂ ♀) (1904)<sup>1</sup>.

♂. Antennæ long, rather stout, subserrate; elytra obliquely sinuato-excavate and bilamellate at the tip, the lamellæ truncate and feebly emarginate, the upper one placed above the cavity externally and the other at the sutural angle; anterior tarsal joint 2 prolonged over the base of 3 above, black at the tip.

♀. Antennæ shorter; elytra with the apical margin simply tumid.

*Hab.* S. AFRICA, Natal<sup>1</sup> (*type of Pic*), Malvern (*Mus. Durban*: ♂ ♀).

A variable insect; the elytra usually with an ante-median fascia and a common apical spot on the suture before the apex testaceous, sometimes bluish-black (the testaceous apex excepted) in ♂, the fascia in this case being indicated by greyish pubescence. The upper surface is opaque and finely sericeo-pubescent. According to Pic, the first joint (= second) of the anterior tarsi is prolonged in ♂. An imperfect specimen of the same sex from Zululand (*Mus. Cape Town*) may also belong here.

5. *Ebæus dunbrodensis*.

*Anthocomus martini*, var. *dunbrodensis*, Pic, L'Echange, xxvii. p. 156 (1911)<sup>1</sup>.

♂. Elytra obliquely sinuato-excavate at the apex, and with a transverse, laterally-angulate lamella within the apical margin externally, the sutural angles obliquely truncate; the other characters as in *E. martini*, Pic.

*Hab.* S. AFRICA, Dunbrody<sup>1</sup> (*Mus. Cape Town*: ♂ ♀), Grahamstown (*ex coll. Fry*: ♀).

One ♂ and three ♀ ♀ seen. Separable from *E. martini* by the uni-lamellate apices of the elytra in the ♂; the markings of the latter are also different, there being no trace of a common subapical testaceous spot in the present insect. The development of the black portion of the prothorax is variable in both of them.

6. *Ebæus sericatus*, sp. n.

♀. Moderately elongate, convex, widened posteriorly, opaque, very finely sericco-pubescent; black, the basal six or seven antennal joints, the prothorax (a triangular or oblong patch on the anterior part of the disc excepted), the legs (the femora in part excepted), and the abdomen in part, testaceous or rufo-testaceous; the elytra flavous, each with a large triangular patch at the base and a rounded or subangular space towards the apex (these markings connected along the middle of the disc in one of the Beira specimens) bluish-black; the head and prothorax almost smooth, the elytra alutaceous, excessively minutely punctate. Head narrower than the prothorax; antennæ rather stout, short, serrate. Prothorax transverse, convex, rounded at the sides, very narrowly margined. Elytra simply rounded at the apex. Posterior tibiae curved.

♂. Anterior tarsal joint 2 raised above the base of 3; elytra with the apical margin tumid and lamellato-truncate, angularly projecting externally, the tumid space not preceded by a deep sinuous groove as in *E. dunbrodensis*; pygidium testaceous.

*Var.* ♀. The elytral markings black and connected down the middle of the disc, the head and prothorax wholly rufo-testaceous.

Length  $2\frac{1}{10}$ – $2\frac{9}{10}$  mm.

*Hab.* S. AFRICA, Salisbury, Rhodesia [type], Beira [var.] (*Dr. Marshall*: ix. 1900, x. 1908).



Two ♂♂ and one ♀ of the Rhodesian form, two ♀♀ from Beira. Exactly like *E. dunbrodensis*, Pic, but with the apices of the elytra differently shaped in the ♂; the basal patch on each elytron triangularly extending backwards and sometimes coalescent with the subapical one along the middle of the disc. There is no tendency in these examples to approach *E. martini* or its var. *natalensis*, Pic.

7. *Ebæus alboguttatus*, sp. n.

♀. Moderately elongate, robust, rather convex, widened posteriorly, shining, clothed with fine scattered pubescence intermixed with long, semierect, black, bristly hairs; rufo-testaceous, the outer joints of the antennæ more or less infusate, the head (a posteriorly-biangular flavous space in front excepted), scutellum, and metasternum black; the lateral and basal margins of the prothorax and the elytra (the reddish apex excepted) white or yellowish-white, each elytron with a very large triangular, apically-produced basal patch (reaching the suture) and a broad, angulate, subapical fascia, these markings narrowly coalescent down the middle of the disc, black; the wings fusco-variegate; the head and prothorax almost smooth, the elytra closely, finely (at the base more strongly) punctured. Head narrower than the prothorax; antennæ short, not very slender, subserrate. Prothorax transverse, rounded at the sides. Elytra moderately long. Legs rather stout.

♂. Antennæ longer; anterior tarsal joint 2 rather stout, long, nigro-pectinate along the entire outer edge; elytra less dilated posteriorly, each deeply excavate before the tip, the apical margin obliquely thickened, produced, bidentate, the suture bearing a stout blackish spiniform process within the cavity.

Length  $3\frac{1}{2}$ –4 mm. (♂ ♀.)

*Hab.* S. AFRICA (*Mus. Cape Town*); Namwala [iii. 1913] and Namwazi [vi. 1914], N.W. Rhodesia (*H. C. Dollman*).

Thirteen specimens, including four males. Near *E. (Mixis) rufithorax*, Pic, the black elytral markings narrowly coalescent down the middle of the disc (leaving sharply-defined whitish patches), the antennæ shorter; the elytral apices of the ♂ obliquely polished, bidentate, deeply excavate, nigro-spinose within.

8. *Ebæus ornatipennis*.

*Attalus* (?) *ornatipennis*, Gorh. Ann. & Mag. Nat. Hist. (7) v. p. 77  
(♂ ♀) (1900)<sup>1</sup>.

♂. Anterior tarsal joint 1 very short, 2 elongate, prolonged over 3 above, nigro-pectinate along the entire outer edge and tip; intermediate tibiae simple; elytra transversely excavate at the apex, the suture of each elytron bearing before the tip a long, erect, compressed, apically-ciliate appendage, which is armed with a triangular tooth at the middle behind, the sutural angles slightly produced, upturned, and dentiform.

*Hab.* RHODESIA, Salisbury<sup>1</sup> (*Mus. Brit.*, *Mus. Durban*: ♂ ♀), Mwengwa (*H. C. Dollman*: 13. xii. 1913, 1. v. 1914: ♀).

Thirteen specimens seen, all ♀ ♀ but two. The elytral appendages of the ♂ were not described by Gorham, though very similar to those of his *E. (Attalus) ridens*. The anterior tarsi in the same sex are formed as in the similarly-coloured, much larger *E. (Miris) simon*, Ab. The black subapical annulus is complete in the ♀, and open posteriorly or horse-shoe-shaped in the ♂. The black basal portion of the head is triangularly produced in front on each side between the eyes.

9. *Ebæus crassicauda*, sp. n.

♂. Moderately elongate, widened behind, shining, sparsely clothed with fine pubescence intermixed with longer bristly hairs; testaceous, the basal half of the head, the scutellum, and metasternum black; the lateral and basal margins of the prothorax and the elytra yellowish-white, each elytron with a large, triangular, backwardly-produced basal patch and an outwardly-extended triangular patch beyond the middle (the latter not reaching the suture), these markings coalescent down the middle of the disc, and a small triangular sutural spot before the tip, black; the head and prothorax almost smooth, the elytra finely punctulate. Head nearly as wide as the prothorax; antennæ rather slender, serrate. Prothorax transverse. Elytra somewhat produced at the apex, transversely excavate before the tip, the suture of each bearing a long, stout, compressed, hooked appendage immediately behind the subapical spot, the sutural angle sharply produced. Anterior tarsal joint 2 nigro-pectinate along the outer edge.

Length  $3\frac{1}{2}$  mm.

*Hab.* S. AFRICA, Leslies, near Umtali, Manica (*Dr. Marshall*: 25. x. 1897).

One male. Of the same general coloration as *E. (Malachius) consobrinus*, Boh., the head more broadly testaceous in front; the elytra with a small additional spot before the tip, and the large patch preceding it subtriangular and not extending so far backward, the puncturing more distinct; the ♂-appendages stout, and abruptly hooked or angulate as seen in profile.

#### 10. *Ebæus bicaudatus*.

*Urodactylus bicaudatus*, J. Thoms. Archives Ent. ii. p. 80, t. 1. figs. 5, 5a (♂)<sup>1</sup> (1858).

*Attalus (Miris) bizonatus*, Ab. de Perrin, Rev. d'Ent. xix. p. 177 (1900) (♂)<sup>2</sup>.

♂. Anterior tarsal joint 2 extending over 3 above, nigropectinate at the tip; intermediate tibiæ simple; posterior tibiæ sinuate, slightly infusate in the middle, and nigromaculate at the tip; elytra with the subapical nigro-violaceous fascia extending for some distance down the suture, the apices transversely excavate and each with a long, compressed, concave appendage arising from near the suture, the appendages abruptly constricted beyond the middle, and with the apical portion curved downwards, hook-like, and pointed at the tip.

♀. Antennæ shorter, feebly serrate; elytral fasciæ transverse.

*Hab.* W. AFRICA, Gaboon<sup>1</sup> (*type of Thomson*), Sierra Leone (*Mus. Brit.*: ♂ ♀), Dakar, Senegal<sup>2</sup> (*type of Abeille de Perrin*, ♂).

The British Museum possesses a pair of this species, acquired in 1858. Thomson's enlarged figure of the elytral appendages is misleading (they are not 3-segmented as shown by him), and he does not mention or show the sinuate, nigro-maculate posterior tibiæ of the male, a character noted by Abeille de Perrin. The antennæ are testaceous and sharply serrate. The base of the head is black. *E. (Urodactylus) uncipennis*, Pic (1903), from San Thomé, is an allied insect with differently-marked elytra.

#### 11. *Ebæus maculipes*, sp. n.

♀. Elongate, widened posteriorly, shining, clothed with scattered pallid pubescence intermixed with long, erect,

black, bristly hairs; testaceous, the margins of the prothorax and the elytra whitish, the latter with a basal and subapical fascia nigro-violaceous; the head and prothorax almost smooth, the elytra finely punctured and sometimes (in immature specimens) with two raised lines on the disc. Head narrower than the prothorax; antennæ short, rather slender, feebly serrate. Prothorax broad, transverse, rounded at the sides, the margins dilated posteriorly. Elytra a little wider than the prothorax. Posterior tibiæ feebly curved.

♂. Antennæ longer and more strongly serrate; anterior tarsal joint 2 projecting over the base of 3, nigro-pectinate along the apical margin; posterior tibiæ curved, acutely dilated at the base within, and nigro-maculate at the apex; elytra subparallel, the apices excavate and strongly angulato-appendiculate, as in the same sex of *E. bicaudatus*.

Var. 1. Narrower, the basal half of the head, the front of the prothorax (owing to the covered base of the head showing through the transparent chitin), and two coalescent triangular spots on the disc at the base, black; the other characters (♂ ♀) as in the type. [Rhodesia.]

Var. 2. The base of the head to a variable extent black, the metallic basal fascia of the elytra hollowed behind, the subapical one somewhat curved, narrow or incomplete; the other characters (♂ ♀) as in the type. [Rhodesia and Masai Reserve.]

Length 3–4 mm. (♂ ♀.)

Hab. S. AFRICA, Kashitu, north of Broken Hill (*H. C. Dollman*: xii. 1914, i. 1915: ♂ ♀), and Salisbury, Rhodesia (*Dr. Marshall*: ix. 1900; ♂), Port Natal (*ex coll. Fry*: ♂, type), Frere (*Mus. Cape Town*: ♀); E. AFRICA, Masai Reserve (*Capt. Luckman*: 4. iii. 1914: ♀).

Three ♂♂, four ♀♀, the pair from Natal, which are similarly coloured, being taken as the types, the three males agreeing in structure. *E. maculipes* is the eastern representative of *E. bicaudatus*, Thoms. (= *bizonatus*, Ab.), differing from it in the shape of the posterior tibiæ of the ♂; the elytral appendages are similarly shaped in the two species.

## 12. *Ebæus ridens*.

*Attalus ridens*, Gorh. Ann. & Mag. Nat. Hist. (7) vii. p. 356 (♂) (1901)<sup>1</sup>.

♂. Anterior tarsal joint 2 prolonged over 3, nigro-pectinate at the tip; intermediate tibiæ simple; elytra

transversely excavate and plicate at the tip, the apices sub-angularly produced, the suture of each elytron bearing a long, compressed appendage which is furnished with a downwardly-curved, hook-like pencil of hairs at the apex, and also with a small angular prominence before the angle.

*Hab.* RHODESIA, Old Umtali in Mashonaland<sup>1</sup> (*Dr. Marshall*).

There are two ♂♂ and one ♀ of this species in the British Museum. It may be known from *E. (Mixis) rufithorax*, Pic, and other very similarly coloured insects by the red head and under surface, and the elongate appendages of the elytra, these being nearly as long as in the same sex of *E. bicaudatus*, Thoms. The subapical black patch is broad, transverse, and subcrescentiform. Gorham compares his insect with *Philhedonus (Anthocomus) felix*, which has simple 4-jointed anterior tarsi in ♂.

### 13. *Ebæus exquisitus*.

*Attalus (Mixis) exquisitus*, Ab. de Perrin, Rev. d'Ent. xix. pp. 164, 176 (1900) (♂ ♀)<sup>1</sup>.

♂. Antennæ short, subserrate; anterior tarsal joint 2 extending over 3 above, nigro-pectinate at tip; elytra deeply excavate at the apex, the excavation preceded by the flattened, apically-constricted, pointed, porrect appendage arising from the suture of each elytron, the sutural angle somewhat pointed as seen from above, raised and subfoliaceous as seen in profile.

*Hab.* S. AFRICA, Hebron, near Kimberley<sup>1</sup> (*types of Abeille de Perrin*), Salisbury, Bulawayo, and Umfuli River (*Dr. Marshall*), Caia, Zambesi (*H. Swale*), Mwengwa and Namwala, Rhodesia, Livingstone, Zambesi (*H. C. Dollman*).

The long series of this species before me includes several males. A rufo-testaceous insect; the elytra subopaque, with a small triangular spot on each side of the scutellum, and a common, irregular, X- or H-shaped mark extending across the disc to near the outer margin, black, the apex and a humeral patch red, and the rest of the surface (like the basal margin of the prothorax) whitish. The ♂ type has been lent me by Dr. Péringuey.

*E. (Mixis) michaelsoni*, Pic (1914), from Omaruru, S.W. Africa, is an allied form.

### 14. *Ebæus sudanicus*, sp. n.

♀. Elongate, widened posteriorly, shining, sparsely

clothed with short bristly hairs; testaceous, the prothorax rufescent, whitish along the basal margin, the elytra with three large whitish patches—one common, elongate, lauciform, extending down the anterior half of the suture, and one, somewhat rounded, on the disc of each elytron beyond the middle—the two post-median spots enclosed by a pyriform nigro-fuscous annulus which extends inward to the suture and narrowly and obliquely forward to the base in one specimen, the scutellum, metasternum, and abdomen slightly infusate; the head and prothorax almost smooth, the elytra closely, very finely punctured. Head a little narrower than the prothorax, the latter strongly transverse; antennæ subserrate, rather short; elytra moderately long.

Length  $2\frac{1}{4}$  mm.

*Hab.* SUDAN, Wad Medani (*H. H. King*: 31. iii. 1920). Two females, found "on cotton." Smaller than the S. African *E. exquisitus*, Ab., *amœnulus*, Boh., etc., the elytra each with a large, pyriform, blackish, post-median annulus, which is continued obliquely forward to the base in one specimen, so as to partly or entirely enclose three large whitish patches.

#### 15. *Ebæus confluentis*, sp. n.

♀. Elongate, rather narrow, widened posteriorly, shining, the elytra in great part opaque, clothed with fine pubescence intermixed with long, erect, blackish hairs; the head, the four or five outer joints of the antennæ, a median vitta on the prothorax (sometimes reduced to a spot at the apex), the scutellum, and metasternum black, the rest of the prothorax rufescent, with the lateral and basal margins yellowish-white, the antennal joints 1-6, the abdomen, and the legs wholly or in part (the intermediate and posterior femora, and sometimes the tibiæ also, often in part black or infusate), testaceous; the elytra with a common oblong or oval spot on the suture below the base, an oblong space on each side of it externally and a subapical patch running forward along the suture, whitish or flavous, the rest of their surface (a reddish space at the tip excepted) black; the head and prothorax almost smooth, the elytra closely, finely punctulate. Head narrower than the prothorax; antennæ rather short, moderately serrate. Prothorax broader than long, obliquely narrowed posteriorly. Elytra moderately long.

♂. Antennæ much longer, more sharply serrate; anterior tarsal joint 2 produced over 3, nigro-pectinate at tip; elytra

less widened posteriorly, transversely excavate and obliquely, bilamellately produced at the tip, the lower lamella forming a hook-like upward dilatation of the sutural angle.

Var.? *havilandi*, n.—Antennal joint 1 infusate above; prothorax with a broad anteriorly-dilated black median vitta; elytra opaque, black, with four sharply-defined white spots—two on the suture and one on each lateral margin. (♀.)

Length  $2\frac{1}{2}$ –3 mm. (♂ ♀.)

Hab. N.W. RHODESIA, Kashitu, N. of Broken Hill [vi., vii. 1915], Mwengwa [vii., viii. 1918, v. 1914] (*H. C. Dollman*: type); NATAL, Estcourt (*Haviland*, in *Mus. Cape Town*: ♀, var.).

Two ♂♂, five ♀♀, three with complete vitta on the prothorax and the legs (the anterior pair excepted) partly black. The Natal form is perhaps specifically distinct. Smaller, narrower, and less robust than *E. alboguttatus*, the apices of the elytra differently shaped in ♂; the appendages, too, are short, compared with those of *E. consobrinus*, Boh.

#### 16. *Ebaeus consobrinus*.

♀. *Malachius consobrinus*, Boh. Ins. Caffr. i. 2, p. 464 (1851)<sup>1</sup>.

♂. Smaller, narrower, and less robust than *E. alboguttatus*, the general coloration similar, except that the antennæ are testaceous, the tips of the posterior tibiæ are sometimes infusate, and the subapical black fascia of the elytra is not emarginate on the middle of the disc behind; elytra closely, minutely punctate, transversely excavate at the tip, the suture of each of them bearing a very long, narrow, pointed, downwardly-curved appendage towards the apex and a slender dentiform process above the apical angle; legs slender; anterior tarsal joint 2 nigro-pectinate at the tip.

♀. Antennæ shorter.

Var. Head with the base only black; the elytra with the elongate basal portion of the black mesially-constricted dorsal stripe narrower, leaving a rufo-testaceous humeral patch, the former sometimes completely separated from the subapical fascia.

Length  $2\frac{3}{4}$ –3 mm.

Hab. S. AFRICA, Chirinda, Mashonaland (*Dr. Marshall*: xi. 1901: ♂), Malvern, Natal (*Mus. Durban*: ♂ ♀), Mfongosi, Zululand (*Mus. Cape Town*: ♀), Gariep River<sup>1</sup>.

Various specimens from the above-quoted localities seem to be referable to *E. consobrinus*, Boh., the type (♀) of which, captured in the Gariep River district, has a rufo-testaceous

head. The form with a reddish humeral patch and the head black at the base approaches *E. (Mixis) exquisitus*, Ab., *amœnulus*, Boh., and *transvaalensis*, Pic (1911); it was found at Malvern and in Zululand. The much smaller size, the very fine elytral puncturing, and the long apical appendages in ♂ distinguish *E. consobrinus* from *E. albo-guttatus*, the last-mentioned character and the testaceous antennæ separating it from *E. confluentis*.

#### 17. *Ebæus argus*.

♂. *Attalus (Mixis) argus*, Ab. de Perrin, Rev. d'Ent. ix. p. 51 (1890)<sup>1</sup>.

♂. "Elytra . . . ad apicem laciniata et plicata, ubi plicatura duobus angulis instructa, toto apice flavo." [*Ab. de Perrin.*]

♀. Elongate-subtriangular, shining, clothed with sparse pubescence intermixed with long erect hairs; testaceous, the head (a subtriangular patch in front excepted), elytra (except a common oblong-oval patch on the suture below the base, an elongate mark at the sides in line with it, but extending forward to beneath the humeri, a large subtriangular spot on the disc near the apex, and a triangular patch at the apex itself, which are flavous or testaceous), metasternum, and abdomen in part, black; the head and prothorax very sparsely, minutely, the elytra somewhat closely and strongly, punctate. Head small, bi-impressed in front; antennæ rather short, serrate. Prothorax transverse, rounded at the sides, the margins explanate and obliquely convergent posteriorly. Elytra elongate, broader at the base than the prothorax, rapidly widening to near the apex, the latter rounded.

Length  $4\frac{1}{2}$  mm.

*Hab.* ABYSSINIA<sup>1</sup> (*Raffray, ex coll. Sharp*).

There is a ♀ of this species in the British Museum. The elytral markings resemble those of *Hedybius formosus*, Reiche, except that there is an additional flavous subapical spot on the disc of each elytron.

#### 18. *Ebæus albopartitus*, sp. n.

♂. Elongate, rather broad, slightly widened posteriorly, the elytra opaque, the rest of the surface shining, clothed with fine pubescence intermixed with long, blackish, bristly hairs; head black, pale yellow in front, the black basal portion triangularly extending forward on each side anteriorly; the prothorax rufescent, the expanded lateral and basal margins



flavescent; the scutellum and two very large subquadrate patches on each elytron (the basal one longer than broad, the other shorter, neither of them reaching the suture or outer margin) black, the rest of the elytra, the rufo-testaceous apex excepted, white; the antennæ, legs, and under surface (the black lateral portions of the meso- and metasternum excepted) testaceous; the head and prothorax almost smooth, the elytra densely punctulate. Head a little narrower than the prothorax, transversely grooved between the eyes; antennæ serrate, rather stout. Prothorax transverse, obliquely narrowed posteriorly. Elytra flattened on the disc, transversely excavate, plicate, and explanate at the apex, the sutural angle obtusely foveate within. Anterior tarsal joint 2 rather long, produced over 3 above, nigropectinate along the entire outer edge. Ventral segment 6 cleft down the middle.

Length 4 mm.

*Hab.* E. AFRICA, W. shore of Lake Nyasa, between Domira Bay and Kotakota (*Dr. Neave*: x. 1910).

One male. A remarkably distinct form with two large, subquadrate, black patches on each elytron, the rest of their surface (the tip excepted) white.

### 19. *Ebæus simoni*.

*Attalus (Mixis) simoni*, Ab. de Perrin, Rev. d'Ent. xix. pp. 164, 176 (1900) (♂ ♀)<sup>1</sup>.

♀. Elongate, robust, rather broad, widened posteriorly, shining, clothed with fine pubescence intermixed with long, erect, blackish setæ; rufo-testaceous or testaceous, the basal half of the head, the scutellum, and under surface (the abdomen excepted) black, the anterior portion of the head, the basal and lateral margins of the prothorax, and the elytra whitish, the elytra each with a large subquadrate spot or patch at the base (not reaching the suture or outer margin), and a horseshoe-shaped mark towards the apex, black; the elytra densely, rather strongly, the head and prothorax sparsely, extremely minutely punctate. Head narrower than the prothorax, feebly bi-impressed between the eyes; antennæ moderately long, rather slender, joints 4-10 obconic. Prothorax broader than long, rounded and explanate at the sides, and also explanate at the base. Elytra wider than the prothorax, conjointly rounded at the apex. Legs stout.

♂. Antennæ a little longer, joints 5-11 infusate at the tip in one specimen; anterior tarsal joint 1 short, 2 elon-

gate, extending over 3 above, and with a conspicuous black comb extending along the entire outer edge and tip; intermediate tibiae twisted, arcuately dilated and closely ciliate near the base within; elytra subparallel, the apices triangularly produced, excavate, the suture of each elytron bearing a short, compressed, sub-bidentate, ciliate appendage before the rather acute angle.

Length 4-4½ mm. (♂ ♀.)

*Hab.* S. AFRICA, Hebron, near Kimberley<sup>1</sup> (*types of Abeille de Perrin*); Lichtenburg, Transvaal (*Dr. Brauns*); Salisbury and Bulawayo (*Dr. Marshall*), and Namwala, Rhodesia (*H. C. Dollman*).

Redescribed from seven specimens, including four ♂♂, captured at various dates between November and March. The type has been lent me by Dr. Péringuey. Larger and more elongate than *E. rufithorax*, var. *rhodesianus*, Pic, and very similarly coloured, except that the subapical black patch is horseshoe-shaped as in *E. ornatipennis*, Gorh., ♂; the ♂ with twisted, basally dilated, intermediate tibiae, and the apices of the elytra appendiculate and triangularly produced.

## 20. *Ebæus inermipennis*.

? *Attalus (Mixis) inermipennis*, Pic, Mélanges exot.-entom. xxv. p. 3 (♂) (1917)<sup>1</sup>.

Extremely like *E. simoni*, Ab., the head broadly testaceous or whitish in front in both sexes; the black basal patch on the elytra oblong, concave within, reaching the scutellum in front, the subapical patch arcuate.

♂. Anterior tarsal joint 2 elongate, produced over 3 above, with a black comb extending along the entire outer edge; intermediate tibiae simple; elytra very deeply, transversely grooved at the apex, the apices themselves broadly subtruncate, tumid, and somewhat explanate, the groove bordered in front near the suture by a short transverse plica.

Length 4-4½ mm. (♂ ♀.)

*Hab.* S. AFRICA, Port Natal<sup>1</sup> (*type of Pic*), Headlands, Mashonaland (*Dr. Marshall*: xi. 1897).

A pair from Mashonaland seem to be referable to this species. *E. (Mixis) inermipennis*, in Pic's "description abrégée," is compared with *E. ridens*, Gorh., and the elytral apices of the ♂ are said to be "tumefactis, non spinosis."

21. *Ebæus sinuatifpes*, sp. n.

Elongate, rather broad, widened posteriorly, shining, the elytra subopaque, sparsely, finely pubescent with scattered, erect, black, bristly hairs intermixed; rufo-testaceous, the head (the anterior margin excepted) and metasternum black, the margins of the prothorax whitish, the elytra flavous, each with two large black patches—the basal one transversely subquadrate, the subapical one broad, arcuate, neither reaching the suture, but both extending to the outer margin; the head and prothorax sparsely, minutely, the elytra densely, finely punctate. Head, antennæ, prothorax, etc., as in *E. simoni*, Ab.

♂. Anterior tarsal joint 2 extending over 3 above, nigro-pectinate at tip; intermediate tibiæ sinuate within, arcuately dilated near the base; elytra each with a tumid, oblique, sinuate, concave area at the apex, the swollen portion preceded by a short transverse groove extending across the suture, the apices narrowly truncate.

Length  $3\frac{1}{2}$ – $3\frac{3}{4}$  mm. (♂ ♀.)

*Hab.* S. AFRICA, Melsetter, Mashonaland [type], and Upper Tongaat, Barwon, Natal (*Dr. Marshall*: x., xii. 1901).

One pair. Very like *E. ridens*, Gorh., and *E. inermipennis*, Pic; the elytral apices of the ♂ are tumid and without appendages as in the latter, and the intermediate tibiæ in the same sex are sinuate within, but less strongly so than in *E. simoni*, Ab.

22. *Ebæus rufithorax*.

*Attalus (Mais) rufithorax*, Pic, L'Echange, xx. p. 33 (♂ ♀) (1904)<sup>1</sup>.

♂. Head black (as in ♀); antennæ moderately long, feebly serrate; anterior tarsal joint 2 extended over 3 above, nigro-pectinate at tip; intermediate tibiæ simple; elytra truncate and transversely excavate at the apex, the depression limited exteriorly by a stout conical tubercle.

*Var.?* Head broadly testaceous in front (♀).

*Attalus (Miris) rufithorax*, var. *rhodesiana*, Pic, op. cit. xxiii. p. 131 (♀) (1907)<sup>2</sup>.

*Hab.* S. AFRICA, Dunbrody<sup>1</sup> (*Mus. Cape Town*, *Mus. Brit.*), George, Cape Colony (*Dr. Brauns*: ♀), Bedford, Cape Colony, and Malvern, Natal (*Mus. Durban*), Mwendwa, Rhodesia<sup>2</sup> (*H. C. Dollman*: 15. iv. 1914: var., ♀).

Four ♂♂ from Dunbrody are before me, as well as others  
*Ann. & Mag. N. Hist.* Ser. 9. Vol., ix. 16

of the same sex from Bedford and Malvern; two ♀ ♀ from Rhodesia are doubtless referable to the variety named by Pic. This insect has the general coloration of *E. videns*, Gorb., except that the head is partly or wholly black; the basal black patch on each elytron is large and reaches the suture, and the subapical one arcuate, showing a tendency to form an incomplete annulus in one of the two females from George.

### 23. *Ebæus ephippiatus*, sp. n.

♀. Elongate, widened posteriorly, the elytra opaque, the rest of the surface shining, finely pubescent, with longer semiereect hairs intermixed; black, the antennal joints 1-6, prothorax (a transverse dark space in front and the whitish lateral margins excepted), tarsi, and tibiæ (the posterior pair at the apex only), and the anterior and intermediate femora in part, testaceous; the elytra each with a complete, oblique, suturally-widened, ante-median fascia, and a common oval spot before the apex (the latter connected with a testaceous spot at the sutural angle), whitish; the head and prothorax almost smooth, the elytra alutaceous and excessively minutely punctate. Head bi-impressed in front; antennæ short, slender, subserrate. Prothorax transverse, small, convex, rounded at the sides, much narrowed behind, the lateral margins explanate posteriorly. Elytra rather long, becoming convex towards the apex. Legs slender; posterior tibiæ curved.

Length  $2\frac{2}{3}$  mm.

*Hab.* S. AFRICA, Dunbrody (*Mus. Cape Town*).

One ♀, captured in December 1912 on *Mimosa*. A sharply maculate form with the elytra marked very much as in the Natal insect named by Pic *E. (Anthonomus) martini*, the latter having an opaque, broader, and more narrowly margined prothorax. The variable *E. dunbrodensis* (ante No. 5), specimens of which are before me, is also somewhat similar. Till the ♂ is found, *E. ephippiatus* cannot be located with certainty.

### 24. *Ebæus bonnefoii*.

? *Attalus (Mixis) bonnefoii*, Pic, *Mélanges exot.-entom.* xxv. p. 3 (♀) (1917).

*Hab.* S. AFRICA, Transvaal (*type of Pic*), Sterkfontein (*H. P. Thomasset, in Mus. Brit.*: ♀), Howick, Natal (*J. Cregoe, in Mus. Durban*: ♀).

Four females before me seem to belong here. They have the black patches on the elytra larger—the anterior one subtriangular and nearly reaching the suture, and the curved subapical one angulate in front and extending downward exteriorly behind. *E. bonnefoni* is probably a variety of *E. inermipennis*, the head being black at the base in both insects; but till the ♂ is found they are best treated as distinct.

25. *Ebæus quadrisignatus*, sp. n.

♀. Moderately elongate, widened posteriorly, shining, clothed with fine pubescence intermixed with long, erect hairs; testaceous or rufo-testaceous, the lateral and basal margins of the prothorax and the elytra pale yellowish or whitish, the basal half of the head, the scutellum, two large patches on each elytron—one basal, triangular (extending inwards to the suture), the other oblique, subangulate anteriorly, on the disc towards the apex (reaching the outer margin, but not the suture)—and the metasternum black; the head and prothorax almost smooth, the elytra closely, very finely punctured. Head much narrower than the elytra; antennæ short, serrate. Prothorax broad, strongly transverse. Elytra moderately long, at the base not wider than the prothorax.

Length  $2\frac{1}{2}$ –3 mm.

*Hab.* RHODESIA, Old Umtali, Mashonaland (*Dr. Marshall*: x., xi. 1897).

Three ♀ ♀. Smaller than *E. rufithorax*, Pic, the elytra more shining, the black subapical patch oblique, not emarginate behind, the anterior one triangular, the head testaceous in front.

26. *Ebæus quadrinotatus*, sp. n.

♀. Larger and more robust than *E. quadrisignatus*; the head black to the anterior margin, transversely depressed or excavate in the middle between the eyes; the prothorax a little less transverse, obliquely narrowed posteriorly; the elytra each with two very large nigro-violaceous spots—one basal, transverse, rounded or subangulate behind, the other on the disc towards the apex larger, rounded, extending outwards to the lateral margin; the metasternum black; the intermixed erect hairs on the upper surface long, blackish.

Length  $3\frac{3}{4}$ –4 mm.

*Hab.* S. AFRICA, Malvern, Natal [type] (*Dr. Marshall*:

ii. 1896, vii. 1903); Mpanzi Mioti (*Mus. Durban*); Seymour, Cape Colony (*Mus. Cape Town*).

Five females, precisely similar, and best treated as specifically distinct from *E. quadrisignatus*, in the absence of males of either of them. *E. (Altalus) transevaulensis*, Pic (1911), type also ♀, not identified amongst the material before me, is said to have the subapical black mark in the form of a sinuate fascia, and it must therefore be different from *E. quadrinotatus*.

### 27. *Ebæus zonarius*, sp. n.

♀. Elongate, rather broad, shining, thickly clothed with very long, erect, black bristly hairs intermixed with fine pubescence; testaceous, the basal half of the head, the metasternum, scutellum, and two very large patches on each elytron—one triangular (reaching the suture), the other in the form of a very broad, anteriorly-rounded, subapical fascia (not quite reaching the suture or outer margin)—black, the rest of the elytra yellowish-white; the head and prothorax faintly punctulate, the elytra densely, very finely punctured. Head narrower than the prothorax; antennæ rather slender, moderately long, subserrate. Prothorax broader than long, obliquely narrowed posteriorly, the lateral and basal margins rather broadly explanate and reflexed. Elytra widened posteriorly.

Length  $3\frac{1}{2}$  mm.

*Hab.* ABYSSINIA (*Raffray, ex coll. Sharp*).

One female. This species is coloured like the Nyasa *E. albopartitus*, except that the large black basal patch on the elytra is triangular and extended inwards to the suture, and the subapical one is less elongate. The elytra, too, are more shining and the antennæ not so stout. *E. zonarius* cannot be identified with any of the allied Abyssinian forms described by Abcille de Perrin in 1890, four of these having nigro-trimaculate elytra.

### 28. *Ebæus nyasensis*, sp. n.

♀. Elongate, slightly widened behind, shining, sparsely clothed with fine pubescence intermixed with longer bristly hairs; testaceous, the head to the anterior margin (the labrum pale flavous), scutellum, and metasternum black; the lateral and basal margins of the prothorax and six spots or patches on the elytra—one, common, elongate-oval, extending down the suture below the base, one on each side in

a line with it (running forwards along the outer margin), one, rounded, on the disc of each towards the apex, and a common transverse apical patch—yellowish-white or flavous, the rest of the elytral surface brownish-black; the head and prothorax almost smooth, the elytra densely, finely punctate. Head nearly as wide as the prothorax; antennæ rather short, serrate. Prothorax broader than long, obliquely narrowed posteriorly. Elytra moderately long.

Length 3–3½ mm.

*Hab.* E. AFRICA, Nyasa (*Mus. Brit.*).

Two specimens. Differs from the allied southern and Rhodesian forms with longitudinally-confluent black markings in having a rather large, rounded, additional whitish subapical spot on each elytron. The elytra themselves are doubtless excavate and appendiculate in ♂.

### 29 *Ebæus antennulus*.

♀. *Malachus amantulus*, Bsh. Ins. Casfiaria, 1, 2, p. 463 (1851).

*Hab.* S. AFRICA, Natal.

A co-type of this insect, communicated by Dr. Sjöstedt, agrees with *E. (Mixis) exquisitus*, Ab., in having a red head; but it has the elytral markings more like those of *E. crassicauda* and *E. consobrinus*, the black mesially-constricted dorsal stripe extending forward to the base (leaving the humeri testaceous) and inward to the suture beyond the middle.

### 30. *Ebæus tetrazona*, sp. n.

♀. Rather broad, widened posteriorly, moderately elongate, the elytra opaque, the rest of the surface shining, finely pubescent, with longer, semierect, black, bristly hairs intermixed; rufo-testaceous, the antennal joints 5–11, palpi, base of head broadly, scutellum, two large transverse patches on each elytron (one basal, the other subapical, not reaching the suture or outer margin), posterior tibiae, tarsi in part, metasternum, and abdomen in great part, black; the head and prothorax almost smooth, the elytra closely, finely, rugulose punctate. Head much narrower than the prothorax; antennæ short, sharply serrate from joint 5 onward. Prothorax convex, transverse, obliquely narrowed posteriorly. Elytra moderately long, with a smoother, somewhat convex area at the apex. Legs rather stout.

*Var.* ♀. Smaller and less robust; the head at the base,

and the outer joints of the antennæ, very slightly infuscate; the legs testaceous, the intermediate femora at the base, and the posterior femora with the basal half or more, black; legs more slender.

Length 3-4 mm.

*Hab.* RHODESIA, Salisbury (*Mus. Cape Town*: 23. ix. 1915; *Dr. Marshall*: x. 1900; var.).

Four ♀ ♀, the two larger ones selected as the types. Not unlike *E. (Attalus) ridens*, Gorh. The elytra less shining and with the black subapical patch transverse, instead of arcuate. *E. nigrofemoratus*, the ♂ of which has pectinate antennæ, is also somewhat similarly marked, except that it has the post-median spot large and rounded. In the Durban Museum there is a small ♀, taken at Upper Tongaat in 1901, with the head, antennæ, and legs black, and the subapical mark very large and rounded, that may belong to the same species.

### 31. *Ebæus cavicauda*, sp. n.

♂. Moderately elongate, rather broad, the elytra opaque, the rest of the surface shining, very finely pubescent with longer semierect hairs intermixed; the eyes, base of the head, scutellum, metasternum, and abdomen in great part, black, the antennæ, the rest of the head, prothorax, and legs wholly testaceous, the elytra olive-green, with the excavated apices black; the head and prothorax almost smooth, the elytra alutaceous and extremely minutely punctate. Head rather broad, flattened in front; antennæ long, strongly dentate from joint 4 onward. Prothorax transverse, explanate and strongly rounded at the sides, much narrowed posteriorly, at the middle distinctly wider than the base of the elytra. Elytra moderately long, parallel at the base and somewhat arcuately widened posteriorly, the apices rather broadly produced, deeply, transversely excavate, separately rounded at the tip, the cavity smooth and shining within. Anterior tarsal joint 2 rather long, extending over 3 above, nigro-pectinate along the oblique apical margin; posterior tibiæ strongly bisinuate.

Length 3 mm.

*Hab.* S. AFRICA, Grahamstown (*O'Neil*, in *Mus. Cape Town*).

One male. Separable from *E. conigerus*, ♂ (ante No. 1), by the olive-green opaque elytra, the longer, dentate, testaceous antennæ, the relatively broader, explanate prothorax,



the black scutellum, the non-dentate, excavate, produced apices of the elytra, and the bisinuate posterior tibiae.

### 32. *Ebæus ramicornis*.

♂. *Anthocomus ramicornis*, Boh. Ins. Caffr. i. 2, p. 469 (1851) <sup>1</sup> ♀

♀. *Attalus africanus*, Pic, L'Echange, xx. p. 26 (1904) - ?

♂. *Ebæomorphus ramicornis*, Pic, l.c. p. 28 <sup>1</sup>.

♂. *Ebæomorphus natalensis*, Pic, Bull. Soc. Ent. Fr. 1917, p. 235 <sup>1</sup>.

♂. Antennæ long, flabellate; elytra with the apex rufo-testaceous, excavate, and bilamellate; anterior tarsal joint 2 nigro-pectinate at the tip.

♀. Antennæ shorter, serrate; elytra wholly metallic.

Length  $2\frac{1}{2}$  mm. (♂ ♀.)

Hub. NATAL <sup>1-1</sup>, Malvern, E. London (*Mus. Durban*, *Mus. Cape Town*: ♂ ♀), Zululand (*ex coll. Fry*: ♀).

Specimens of the two sexes of this insect have been sent me by Dr. Péringuey and Mr. C. Barker. Boheman's type (♂) is described as having black elytra, with the apex rufo-testaceous, that of Pic (♂) being metallic, except at the tip, the diagnoses agreeing in other respects. The black patch on the disc of the prothorax varies in development, and in the ♀ it is sometimes reduced to a large spot in front. The numerous ♂ examples before me agree with Pic's description of that sex; the ♀ might easily be mistaken for an *Attalus*.

### 33. *Ebæus dichrous*, sp. n.

♀. Rather short, broad, much widened posteriorly, shining, finely sericeo-pubescent; head (the eyes excepted), the antennal joints 1-5 in part (1 nigro-lineate above, and 6-11 more or less infuscate), prothorax, and legs (the slightly infuscate tarsi excepted) testaceous, the elytra cyaneous, the scutellum, metasternum, and abdomen piceous or black; the head and prothorax almost smooth, the elytra very finely, rather closely punctate. Head broad; antennæ long, serrate from joint 5 onward. Prothorax strongly transverse, much wider than the head, rounded at the sides, the margins somewhat expanded. Elytra subarcuately dilated from a little below the base, depressed along the suture anteriorly.

Length 3 mm.

Hub. NATAL, Malvern (*Mus. Durban*).

Two ♀ ♀, labelled as having been captured on July 25th, 1901. Larger and broader than *E. ramicornis* (♀), the head, prothorax, and legs testaceous. Till the ♂ is found, *E. dichrous* can be placed near that species. *E. conigerus* is a

more robust insect, and is somewhat similarly coloured. A co-type of *E. dichrous* has been placed in the British Museum.

### 34. *Ithæus apricus*.

♀. *Anthocomus apricus*, Gorh. Ann. & Mag. Nat. Hist. (7) v. p. 78 (1900)<sup>1</sup>.

♀ *Attalus sublimbatus*, Pic, L'Echange, xxiii. p. 131 (1907) ~.

Var. ♂. *Ithæomorphus transvaalensis*, Pic, Bull. Soc. Ent. Fr. 1917, p. 235<sup>1</sup>.

Var. ♀. *Ethæomorphus transvaalensis*, var. *rufo-apicalis*, Pic, Mélanges exot.-entom. xxv. p. 3 (1917)<sup>1</sup>.

♂. Antennæ long, pectinate; elytra slightly produced at the tip, depressed and transversely grooved before the apex, the apical portion tumid; anterior tarsal joint 2 elongated, reaching the apex of 3 above, and nigro-pectinate along the outer edge and at the tip; terminal dorsal segment of abdomen rather long, narrow, sulcate, testaceous.

♀. Antennæ shorter, serrate; terminal dorsal segment of abdomen shorter and broader, black.

*Hab.* S. AFRICA, Estcourt<sup>1</sup> and Frere, Natal, Salisbury, Bulawayo<sup>2</sup> (*Mus. Brit.*; *Mus. Cape Town*), Reenen (*Mus. Durban*), Transvaal<sup>3</sup> <sup>1</sup>.

Numerous males and females seen, including a specimen (♀) of the var. *rufo-apicalis*, Pic. The ♂ of *E. apricus* has the testaceous apical marking of the elytra extending further forward along the suture and rather broadly connected externally with the lateral patch. The elytra are wholly black in the ♂ named by Pic; the apex only is rufo-testaceous in his *E. rufo-apicalis*. The upper surface of the body is sparsely clothed with long hairs intermixed with the shorter decumbent pubescence. The Natal specimens (♂ ♀) in the Cape Town Museum are labelled *Anthocomus ramicornis*, Boh., which has the prothorax red, with a black patch on the disc.

### 35. *Ethæus pectinimanus*, sp. n.

♀. Moderately elongate, rather broad, shining, the elytra subopaque, finely pubescent, without longer hairs intermixed; black, the elytra with a common oval space below the base, extending down the suture to the large triangular apical patch, and a triangular space at the sides below the humeri, testaceous, the antennæ in great part and legs (the posterior femora, and the others at the base, excepted) also

testaceous; the head and prothorax very sparsely, the elytra densely, extremely minutely punctate. Head narrower than the prothorax, bi-impressed in front; antennæ short, serrate. Prothorax large, convex, transverse, rounded at the sides, narrowly margined. Elytra at the base about as wide as the prothorax, moderately long, subparallel.

♂. Antennæ, legs, and the two terminal abdominal segments, testaceous, the testaceous markings on the elytra more extended, the sutural and lateral patches broadly connected with the pallid apical space; head a little broader, the eyes more prominent; antennæ much longer, strongly pectinate; elytra each with an arcuate excavation towards the apex, the apical portion somewhat narrowly produced, raised and strongly tumid along the suture; anterior tarsal joint 1 short, 2 elongate, reaching the apex of 3 above, and with a black comb extending along the outer edge; pygidium rather long and narrow, sulcate at tip.

Length 3 mm. (♂ ♀.)

*Hab.* S. AFRICA, Bulawayo (*Dr. Marshall*: ♂ ♀), Lonely, Rhodesia (*H. Swale*: ♀).

One ♂, seven ♀ ♀. Very near *E. (Anthocomus) apricus*, Gorh., the elytra with a common oval testaceous space before the middle, connected along the suture with the apical patch; the ♂ with shorter, pectinate antennæ, the elytral apices more swollen beyond the subapical sulcus and narrowly produced, and the last two abdominal segments testaceous. *E. apricus* was also found at Bulawayo.

### 36. *Ebæus nigrofemoratus*, sp. n.

♀. Moderately elongate, widened posteriorly, finely pubescent, without long hairs intermixed, the elytra opaque, the rest of the surface shining; black, the three basal joints of the antennæ beneath, prothorax, elytra, tibiae, and bases of the tarsi testaceous or rufo-testaceous; the elytra with a common transverse patch at the base, extending narrowly outwards to the humeri, and a large rounded spot on the disc of each towards the apex, black; the head and prothorax very sparsely, minutely, the elytra closely, very finely, punctate. Head small, much narrower than the prothorax; antennæ serrate, rather slender, short. Prothorax transverse, convex, obliquely narrowed posteriorly. Elytra much broader than the prothorax, comparatively short.

♂. Antennæ long, pectinate; anterior tarsal joint 2 elongated, reaching the apex of 3 above, nigro-pectinate along

the outer edge; pygidium sharply sulcate; elytra obliquely truncate and hollowed towards the sutural angle, the apices a little smother.

Length 3–3½ mm. (♂ ♀.)

*Hab.* NATAL, Frere and Estcourt (*Dr. Marshall*: x. 1892, ix. 1896, i. 1897).

Three ♂♂, three ♀♀. Not unlike *E. apricus*, Gorh., but very differently coloured, the head smaller; the elytra without apical excavation in ♂, the pygidium broad, black, and sulcate in the same sex.

*Alphabetical numbered list of species of Ebæus enumerated in this paper; those marked with an asterisk are treated as new.*

\*albuguttatus, 7.

\*albopartitus, 18.

amœnulus, 29.

apricus, 34.

argus, 17.

bicaudatus, 10.

bonnefoi, 24.

\*cavicauda, 31.

\*confluens, 15.

\*conigerus, 1.

consobrinus, 16.

\*crassicauda, 9.

\*dichrous, 33.

dunbrodensis, 5.

\*ephippiatus, 23.

exquisitus, 13.

inermipennis, 20.

\*maculipes, 11.

martini, 4.

\*nairobiensis, 2.

\*nigrofemoratus, 36.

\*nyasanus, 28.

ornatipennis, 8.

\*pectinimanus, 35.

\*quadrinotatus, 26.

\*quadrisignatus, 25.

ramicornis, 32.

ridens, 12.

†rubricatus, 3.

rufithorax, 22.

\*sericatus, 6.

simoni, 19.

\*sinuatipes, 21.

\*sudanicus, 14.

†tetrazona, 30.

\*zonarius, 27.

#### SYNONYMS, VARIETIES, ETC.

africanus, 32.

bizonatus, 10.

\*haviglandi, 15.

natalensis, 4, 32.

rhodesiana, 22.

rufo-apicalis, 34.

sublimbatus, 34.

transvaalensis, 31.

#### XXVI.—*Descriptions and Records of Bees.*—XCII.

By T. D. A. COCKERELL, University of Colorado.

##### *Andrena precocella*, Cockerell, 1917.

Col. C. G. Nurse took this species in abundance at Quetta, March 1903. The female is new, and is so unlike the male that it requires a separate description.

♀.—Length about 11 mm.

Black, with the second and third abdominal segments, and broad apex of first, bright ferruginous; the second segment

has a black spot on each side, and usually a more or less distinct median mark; the third segment has a variable transverse black stain or patch; hair long, dull white, black at extreme sides of face and on vertex; head large and broad, facial quadrangle much broader than long; facial foveæ narrow; process of labrum large, broadly truncate; malar space short but distinct; clypeus convex, ridged, polished, with irregular coarse punctures, very few in the apical region; third antennal joint long and slender; mesothorax dull and punctured, the posterior middle more shining; scutellum shining; area of metathorax dull, not distinctly sculptured or defined; tegulæ dark reddish. Wings clear; stigma bright ferruginous. Legs black, inner face of hind basitarsi with white hair. Fourth abdominal segment with a thick white hair-band, second and third with weaker ones; apex with dark chocolate hair; abdomen shining.

This female resembles that of *A. ilerda*, Cameron (which has a very different male), but is easily separated by the black legs and antennæ, &c. The male *ilerda* is more like that of *A. bipartita*, Brullé (*antilope*, Pérez).

*Andrena melandura*, n. n.

*Andrena bipartita*, Lepeletier, 1841 (not Brullé, 1840); *A. lepeletieri*, Dalla Torre, 1896 (not Lucas, 1846). Algeria.

I examined a good series in the British Museum. The male abdomen is all black, but the female has the first two segments red.

*Andrena truncatiformis*, n. n.

*Andrena truncata*, Pérez, 1903; not *A. truncata*, Viereck, 1903. N. Africa.

Viereck's paper is in Trans. Am. Ent. Soc. for December 1902, issued March 20, 1903. I believe it has priority.

*Andrena heteropoda*, sp. n.

♀ (type).—Length about 10 mm.

Rather robust, black, with the hind tibiae and basitarsi (but not the small joints of tarsi, or the other tibiae and tarsi) light ferruginous; head and thorax with white hair, not very dense or long, but abundant and clear white at sides of face; no tooth or tubercle at base of mandibles; process of labrum bidentate; clypeus flattened, dull, with fine punctures, and no smooth median line; flagellum obscurely brownish beneath; third antennal joint about 400 microns long, the

fourth and fifth each about 175 (the proportions about as in *A. clarkella*); mesothorax dull, very inconspicuously punctured, with a median groove; scutellum shining, with very fine scattered punctures; area of metathorax dull, without evident sculpture, poorly defined; tegulae dark reddish. Wings hyaline, faintly dusky; stigma amber-colour, nervures pale fuscous; b.n. going basad of t.-m.; first r.n. joining second s.m. considerably beyond middle. Legs with white hair, tinged with golden on inner side of tarsi; tibial scopa abundant and pure white. Abdomen dullish, without evident sculpture (there are excessively minute punctures); segments with narrow white hair-bands, reduced to lateral patches on first, broadly interrupted on second, slightly or not on third and fourth; apical hair white, faintly stained with brownish around the plate; second segment depressed hardly a third. The facial foveae are broad, white, stained with brownish at upper end.

♂.—Length about 8.5 mm.

More slender, with all the tibiae and basitarsi black; face with abundant white hair (no black at sides); clypeus black, shining and distinctly punctured, with a median ridge on upper part; mandibles red at end, simple at base; cheeks ordinary, hairy; flagellum obscurely brown beneath; third antennal joint scarcely longer than fourth (proportions about as in *A. nigriceps*); abdomen rather more shining.

Quetta, India; numerous specimens of each sex taken by Col. C. G. Nurse. One male is dated July 1903.

The female resembles *A. wilkella*, Kirby, but is less robust, with head not so broad, and sides of face with pure white hair. In the table in 'Apidæ Europææ' it runs out at 188, and the male runs to 160; but the species is very distinct from *A. soror*, L. Duf. *A. anonyma*, Cam., has a similar dull mesothorax, but differs by the broad second s.m. and the brilliant white bands of abdomen, those of *heteropoda* being rather inconspicuous, though clear white. *A. anonyma* has a red clypeal mark, wanting in *heteropoda*.

*Andrena cryptodonta*, sp. n.

♀.—Length about 9 mm.

Black, including the mandibles, antennæ, and legs; head and thorax with pure white hair, abundant on face and sides of metathorax; inner tooth of mandibles sometimes red; just above base of mandibles, behind, is a small rounded dentiform tubercle; process of labrum emarginate; clypeus very hairy, indistinctly punctured, with a broad median

shining ridge; facial foveæ broad, white, brownish at upper end; third antennal joint about 300 microns long, fourth and fifth each about 160; mesothorax and scutellum shining, with fine easily visible punctures; area of metathorax granular and poorly defined, with a median tuft of white hair overlapping it; tegulæ dark reddish. Wings clear, apical margin faintly brownish; stigma dull ferruginous bordered with fuscous, nervures fuscous; b. n. falling short of t.-m.; second s.m. rather narrow, receiving first r. n. about middle. Hair of legs white; tibial scopa rather short and stiff, white, with a reddish stain below the knee-plate; spurs pale red. Abdomen shining, with distinct but minute punctures; segments with rather broad pure white hair-bands, on first segment reduced to a patch on each side, on second broadly interrupted, on third and fourth entire; hair at apex white, faintly stained with brown; second segment depressed about two-fifths.

The type is from Peshin, India, April 1903 (*Nurse*); in U.S. National Museum. I have another from Quetta, April 1903 (*Nurse*).

A neat little species, which runs in 'Apidæ Europææ' to 197, and runs out. It also runs out in my MS. tables of Indian species. The hind tibiæ are shaped about as in *A. varians*, but the insect resembles *A. dorsata* in the abundant hair of posterior part of thorax.

Morawitz described fifty-two species of *Andrena* from Turkestan. Of these I found only *tenuis* and *turkestanica* in the British Museum. The latter appears to be widespread, as there is a specimen at Oxford from Egypt. *A. tenuis* has been found at Peshin and *A. cussariensis* at Kohat; but, with these exceptions, we have not been able to find the Morawitzian species in the Indian region.

In the Caucasus and Transcaucasus is another long series of *Andrena* with little in common with the Turkestan or Indian faunæ. It thus appears that, except for a few wide-ranging species, *Andrena* in Asia shows very strong local endemism.

*Andrena flavipes*, Panzer (*fulvicornis*, Kirby).

Many specimens of both sexes collected by Col. Nurse in Kashmir, 6000-7000 ft., April and May 1901. There is also a ♀ from Simla, Sept. 1898. Perkins found the species double-brooded in England. Morawitz records this species from Turkestan, and I am unable to separate the Indian form. The Indian female, compared with *flavipes* from Gray,

France (*André*), does, indeed, differ in the pure white (instead of yellowish) abdominal bands and the distinctly darker wings; it also differs in the presence of dark hair on the thoracic dorsum. But a form of *flavipes* from Algeria, received from Vachal, has the differential characters of the Indian specimens, though the hair of the thoracic dorsum is shorter. The Indian male is like that from France.

Mixed with the series I found two males of *Colletes reticulata* (Cam.) from Simla, Sept. 1898 (*Nurse*).

*Anthidium nursei*, sp. n.

♂ (type).—Length about 14 mm.

Closely allied to *A. manicatum* (L.), to which it exactly runs in Friese's tables, but differing thus:—Markings cream-colour instead of orange; dorsum of thorax much less hairy; a pale supraclypeal band and no black marks at upper end of clypeus; abdominal segments 1 to 6 each with four distinct widely separated spots; lateral apical teeth of abdomen stouter, with broad base. The type-specimen has two widely separated occipital spots and large elongate marks at upper end of cheeks; markings of mesothorax confined to two small spots in front and a short band over each tegula; axillæ black; scutellum with two small marks; stripe on anterior tibiæ broken; the two median spots on first abdominal segment very small.

♂, var. *optimum*, nov.—Marks on upper part of cheeks large, cuneiform, connected with occipital band, which is interrupted in middle; mesothorax with a pair of slender curved discal stripes, and lateral bands continuous in front with bands which are enlarged at end and abruptly truncated at a point in line with end of discal stripe; axillæ and a very broad band at each side of scutellum cream-colour; abdominal spots larger, the lateral ones square, lateral spots on sixth segment connected with median; band on anterior tibiæ entire. Collected Feb. 1902.

♀.—Length about 10 mm.

Ventral scopa white. Differs from *A. manicatum* thus:—Markings cream-colour; abdominal segments 1 to 5 each with four large spots, 6 with two spots; clypeus entirely pale except narrow lower margin; a continuous band from middle of cheeks across occiput, and a small stripe on lower part of cheeks; mesothorax with a pair of discal stripes; markings on scutellum larger; hair at sides of metathorax pure white; femora without red; tarsi densely covered with pure white hair on outer side; dorsum of thorax almost bare.







In Friese's table this runs to the vicinity of *A. tessellatum* and *A. dalmaticum*, but is not related to these species.

Deesa, India; 2 ♂ and 5 ♀ collected by Col. C. G. Nurse.  
The type of var. *optimum* is in the U.S. National Museum.

*Melitta cameroni* (Cockerell).

*Andrena caroli*, Cam. (preoccupied), was altered to *cameroni*. Col. Nurse has kindly given me a pair from Simla, Aug. 1898, at the same time pointing out that the species belongs to *Melitta*. It is remarkable for the subtriangular shape of the third submarginal cell, which is much contracted above, with the oblique outer side nearly straight.

*Nomia taprobanæ* (Cameron).

*Halictus taprobanæ*, Cam., from Ceylon, is a *Nomia*, as shown by the type in the Rothney collection.

*Nomia garrulus* (Cameron).

*Halictus garrulus*, Cam., from India, is a *Nomia*; I saw the type in the Rothney collection.

The following table separates three male *Nomia* described by Cameron as *Halictus* (all have the tegulæ testaceous or reddish and the mesothorax dull):—

Larger; abdomen claviform; hind basitarsi yellowish white .....	<i>pulchriventris</i> (Cam.).
Smaller; postscutellum covered with white tomentum.	
Face broad; hind tibiæ pale red; hind tarsi very pale yellow .....	<i>garrulus</i> (Cam.).
Smaller; hind tibiæ dark fuscous, pale at end.	<i>taprobanæ</i> (Cam.).

*Sphecodes dissimulandus* (Cameron).

*Halictus dissimulandus*, Cameron, from India. Type in Rothney collection.

Male, with abdomen dark red; second s.m. very narrow; flagellum thick, moniliform.

*Sphecodes invidus* (Cameron).

*Halictus invidus*, Cam., from India. Type in Rothney collection.

Male, with abdomen red at end of first and whole of second

segments; flagellum moniliform; face broad, covered with white hair; mesothorax very coarsely and densely punctured; area of metathorax with very coarse sculpture.

*Halictopoda fulvipes*, Cameron.

Type ♀ in Rothney collection.

Clypeus keeled; first two abdominal segments ferruginous, the others black.

The male placed with it is a *Thrinchostoma*. For the true male, see Descr. Rec. Bees, LXXXIX. p. 202.

*Nomia savignyi*, Kohl.

Quetta, India, July 1903 (*Nurse*). ♂.

*Nomia flavolobata*, Cockerell.

Deesa, India, April 1901 (*Nurse*). ♂.

*Nomia orybeloides*, Smith.

Deesa, India, June 1898, ♂ ♀ (*Nurse*); Abu, India, ♂ (*Nurse*).

*Colletes deesensis*, sp. n.

♀.—Length about 14 mm., anterior wing 9 mm.

In my table (M.S.) of Indian *Colletes* this runs exactly to *C. nursei*, Cam. (from Ferozepore), and I at first took it for that species. However, Col. Nurse gave it to me as a species unknown to him, and it differs from Cameron's description as follows:—Mandibles entirely black; vertex finely roughened, without distinct punctures; middle of mesothorax impunctate; area of metathorax polished, with irregular rugae on upper part, not forming distinct spaces. Legs without black hair (but this reference in Cameron is probably an error for thick). Basal segment of abdomen fringed with pure white hair at sides, but disc covered with dense yellowish-tinted hair (with long hairs intermixed), leaving a rather ill-defined partly reddened exposed band before the broad felt-like apical band, which is tinted with ochreous, pure white only at sides; apical segment above with yellowish-grey hair, not at all black.

The following characters are distinctive of the species:—Clypeus swollen, very irregularly punctured, the upper part grooved; labrum with a median pit and lateral sulci; malar space dull, nearly twice as broad as long; antennae black;

head and thorax densely covered with white hair, tinged with ochreous on vertex and scutellum; tegulæ clear testaceous; wings clear, stigma ferruginous; hind femora and tibiæ clear red, with much light fulvous hair; abdomen with very broad felt-like bands.

Deesa, India, March 1900 (*Nurse*).

In Feb. 1899 Col. Nurse collected a male at Deesa which may, I think, be referred here. It is, of course, smaller (length hardly 11 mm.) and more slender, but it has the same general appearance. The hind femora, however, are dark and their tibiæ are strongly infuscated except apically, while all the tarsi are ferruginous. The flagellum is dusky reddish beneath and the malar space is longer than broad. This male is very easily known from *C. hylæiformis*, Eversm., by the long malar space and the total lack of coarse punctures on the exposed parts of abdomen. The face and front are densely covered with pure white hair, and there is a fringe of very long hair about the ocelli. The hair of the metathorax is pure white, that of the scutellum very faintly yellowish.

Specimens of all the new forms described above will be found in the Nurse collection at the British Museum.

XXVII.—*Note on the Œsophageal Teeth of the Stromateidæ.*  
By J. D. F. GILCHRIST, M.A., D.Sc.

IN this family of fishes certain structures, variously described as "teeth," "tooth-like processes," "long barbed teeth," "internal papillæ beset with setiform teeth," &c., are mentioned as occurring in the œsophagus. The presence of teeth, or structures homologous with teeth, is scarcely to be expected in this region of the alimentary tract, and is therefore of some interest. The fact also that these "teeth" are found in two large saccular outgrowths of the alimentary tract, just behind the branchial region, is suggestive of a pair of closed gill-slits, and is another point worthy of attention.

These toothed sacs do not seem to have been further investigated or compared in different types, and the examination of species of *Psenes*, *Stromateus*, and *Nomeus* show some noteworthy features and differences. In these, internal papillæ—or, rather, lobes—beset with setiform structures were found, and, in one species of *Psenes* and *Stromateus*, tooth-like processes with barbs. The last cases present some

striking features, and may be considered first. The species of *Psenes*, which was found in rather deep water off the coast of Natal, seems to be new, and may be provisionally called *P. natalensis* for convenience.

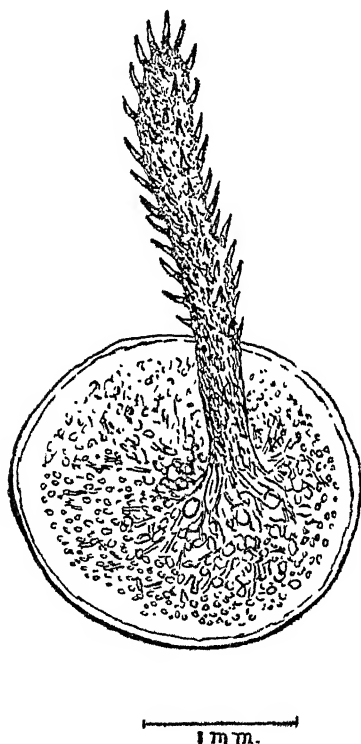
*Psenes natalensis.*

The œsophageal pouches are conspicuous structures lying in the anterior end of the coelom, apparently on the œsophagus, just behind the pharyngeal region. In a mature specimen of 150 mm. they measure 16 mm. in length, or slightly larger than the diameter of the eye of the fish. They measure 7 mm. in vertical diameter. Unlike other cases, to be noted later, they lie parallel with the alimentary tract, and do not extend below the level of its lower margin. Externally the whole structure consists of a great thickening of the muscular layers of the splanchnopleure. Internally it is lined by the endoderm, which expands out on each side dorso-laterally to form the pouches in which the "teeth" are lodged. It is the nature of this endoderm and its tooth-like structures which is in question, but the relation of this whole structure to the branchial system may first be considered. It is in direct and intimate connection with the fifth branchial arch, the ceratobranchials of which are long and slender. They meet each other ventrally at a point, where they are supported at the end of the basal elements of the other arches. There is a small slit separating the fourth and fifth arch, and on the latter there are about seven reduced gill-rakers. They pass upwards on each side of the anterior end of the œsophageal sacs, which they thus support. They are continued dorsally, as small epibranchial elements, directed forwards to very large well-calcified pharyngo-branchials, which are fused together to form a stout concave structure, in which the mass is firmly secured. The teeth on these upper pharyngeals are well developed, and form rounded patches, which lie in the anterior end of the œsophageal sacs, but do not penetrate further back, nor assume a lobed projecting form, as they do in types noted below. Posterior to these teeth and in the sacs lie the œsophageal teeth.

The sacs have thick walls, in which two muscular layers may be distinguished—an outer transverse layer and an inner longitudinal layer. On removing these, a somewhat remarkable appearance is presented, the whole of the exposed surface being covered with a series of what appears to be overlapping scales, each measuring between 2 and 3 mm. in diameter. On removing one of these it was found that

attached to its centre was one of the tooth-like processes which line the interior of each sac, and it was at first supposed that the placoid nature of the teeth was thus evident. On further examination, however, no lines of growth were seen in the scale, it was unaffected by acid, and, on boiling in caustic potash, it was seen to be made up of a somewhat

Fig. 1.



One of the tooth-like processes of the œsophageal sacs of  
*Psenes natalensis*.

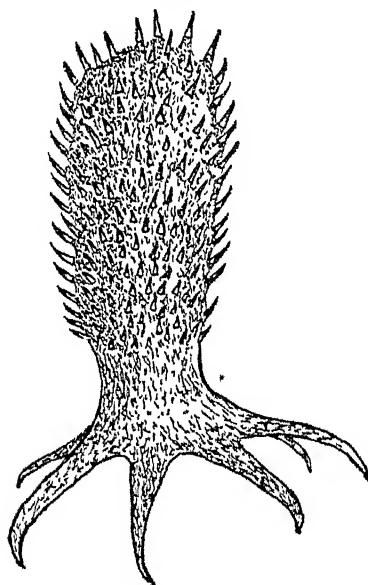
reticulate fibrous sheet of clear horny-looking tissue. Towards the periphery this substance was homogeneous, and near the centre fibres could be seen passing upwards to form the long "tooth" (text-fig. 1). On its upper two-thirds there were short offshoots, each capped with a hollow, sharp, curved spine, the longest being about .33 mm. They thus differ

markedly from the pharyngeal teeth, which form a small part of the inner lining of the sac at its anterior end. They bear a close resemblance to the gill-rakers, which in this fish are well developed. One of these, which was cut and treated in the same way, showed the same structure. It was 2.89 mm. in length; the spines were not, however, slightly curved, as in the œsophageal teeth. The conclusion arrived at is that, in this case, some of the teeth of the œsophageal sacs are teeth of the upper pharyngeals, most of them, however, being homologous with gill-rakers probably arising as an extension backwards of the epithelium of the last gill-arch.

*Stromateus capensis.*

The œsophageal sacs in this species form an almost spherical mass, about 17 mm. in diameter in a fish 200 mm.

Fig. 2.



One of the tooth-like processes of the œsophageal sacs of *Stromateus capensis*. Magnification the same as Fig. 1.

in length, or one and a half times the diameter of the eye. It is nearer the branchial region than in the last case, and is



supported mainly by the epibranchial and pharyngo-branchials of the fourth gill-arch. The toothed upper pharyngeals are not rounded patches, but are in the form of two ridges which project backwards and end in pointed free extremities projecting into the opening of each sac. There are a few reduced anterior gill-rakers on the fifth branchial arch, and the opening of the œsophageal pouch is immediately behind the gill-arch, so that there is a more apparent transition between the gill-rakers and the œsophageal teeth, which might therefore be readily interpreted as the posterior gill-rakers of the fifth branchial arch. These teeth are apparently of the same nature as in the last case. There is a marked difference, however, in their basal expansion, for they are firmly fixed in the muscular wall of the pouch, not by a circular scale-like structure, but by a number of root-like processes, which are more or less curved at their pointed extremities (text-fig. 2).

*Psenes* (*Atimostoma*, Smith; *Cubiceps*, Günther) *capensis*.

The œsophageal sacs of this species do not, as in *P. natalensis*, lie parallel with the œsophagus, but more or less across it, following the general contour of the branchial arches. They thus project below the level of the œsophagus. They are closer to the branchial arches, and are mainly supported by the fourth. The most noteworthy difference is the greater development of the toothed upper pharyngeals. These, in the first arch, are poorly developed, and have no teeth, those of the second have a small patch of teeth, those of the third are well developed, and those of the fourth extend backwards as large toothed lobes into the œsophagus, past the openings of the two œsophageal pouches. The pouches are provided with rounded toothed lobes or papillæ similar to the pharyngo-branchials of the fourth arch. The long horny processes resembling gill-rakers are entirely absent in this species, and the inner lining of the œsophageal sacs seems to be entirely derived from a backward extension of the tooth-bearing epithelium of the superior pharyngeals. This epithelium can readily be distinguished from the œsophageal epithelium, which in this and some other species of the Stromateidæ is characterized by longitudinal foldings. These extend forward on the floor of the œsophagus between the sacs, and pass over the lip of the sac but not into it.

*Nomeus gronovii*.

In this fish the œsophageal sacs follow still more closely

the general direction of the branchial arches. As in the last case, the toothed epithelium of the upper branchial elements projects backwards as a stout lobe into the œsophagus, between the opening of the sacs, and is followed by several series of smaller lobes which line the interior of the sac, as in *Psenes capensis*.

Material was not available for the further examination of this and other types, which would no doubt throw further light on the structure and homology of these sacs, which we may, however, reasonably conclude, from the above evidence, are not strictly œsophageal, but are derived from an extension backwards of pharyngeal epithelium in the form of two pouches. There seems to be at least two distinct types, in which the lining of the sacs is derived from the toothed epithelium of the pharyngo-branchials, and the other in which it is derived from the raker-bearing elements of the gill-arch. The distinction may also prove to be of systematic importance, in which case species resembling *Psenes capensis* would be generically separated from species resembling *P. natalensis* in respect of the nature of their œsophageal teeth.

The origin of the conspicuous paired saccular outgrowths lined by pharyngeal epithelium is of interest, as they may date from a time in the phylogeny of the Teleosts when the gill-slit behind the fifth branchial arch began to close up, and may now be all that remains of this gill-slit. Their development and further comparative study of their structure in various groups (they also occur in the Tetragonuridæ) might throw some light on this point. Certainly in *Nomeus* they bear a striking, if superficial, resemblance in position to a gill-slit.

The physiological significance of the œsophageal teeth which are found in these fishes is of interest, and has doubtless some connexion with the nature of their food. The teeth of the jaws are poorly developed, and in some there are gill-raker-like structures below the pseudobranchiæ. It is known that some feed on medusæ. *Nomeus*—the well-known Portuguese man-of-war fish—is said to find protection from its enemies by hiding under the poisonous tentacles of the Portuguese man-of-war *Physalia*, and perhaps securing the jackal's share of its food; but it may be suspected that its object there, among medusæ-producing gonophores as well as poisonous tentacles, is not such an innocent one. The nature of the food may again be associated with another peculiar feature, well developed in some. Pores are described as occurring on the surface of the body, and these, when traced

into the underlying tissue in a species of *Centrolophus* from deep water at the Cape, were found to lead into a network of wide dermal canals, extending over the body, and filled with a viscid oily substance. The Cape "butter-fish"—*Stromateus capensis*—is highly prized for its fine flavour, while the *Centrolophus* referred to produces some kind of sickness or gastric disturbance when eaten—facts which have been noted in other members of the Stiomateidæ.

XXVIII.—*A short Description of the Genitalia of (Ancistrocephalus) polypteri, Leydig, 1853.* By A. J. HESSE, B.Sc.\*

THE Cestode *Ancistrocephalus polypteri* parasitic in the intestine of *Polypterus bichir* was found by Dr. Leydig of Würzburg in 1853. He described the scolex, but, as his specimens were either not mature or were the anterior portions of the Cestode, he was unable to give an account of the genitalia. No further account has since appeared. This description is made from material obtained from Professor Leiper's collection. The material was rather limited and preserved in formalin solution. There were present two different kinds of worms. Two were Cyclophyllids, and the rest, consisting of a few pieces of sexually mature proglottides, a few knotted segments, and two heads with about 9 to 15 cm. of strobila, were used by me to give this description.

*External Appearance.*

The worms showed a dirty white colour in the preserving-fluid. As the worms were not complete, a definite length cannot be given.

The scolex was about 1 mm. long and .5 mm. broad. Superficially it was club-shaped, with an anterior blunt and rounded margin.

There was present a crown of hooks in the form of four radiating groups. These were situated on four well-marked ridges. Each group had six claw-like hooks connected by a web-like structure (fig. 1).

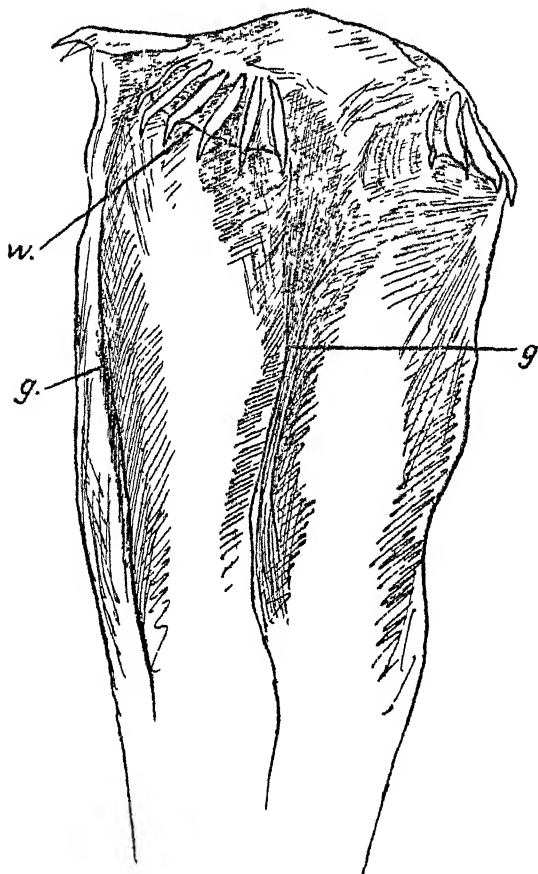
Between the ridges passed down four shallow grooves, which are probably sucking-grooves. These were not well developed at all.

\* From the Helminthological Department, London School of Tropical Medicine.

When viewed from the top the head resembled a cross, with the groups of hooks on the four corners.

The head was followed by a thin neck, the length of which varied in the two specimens. In one it was 2 mm. in length,

Fig. 1.



in the other it was shorter. Posterior to the neck followed a string of long, round, and thin segments resembling fine sewing-cotton. This stretch of segments was about 2.5 cm. long in one specimen. Still more posteriorly the segments broadened out—however, nowhere more than 2 mm. (fig. 2).

The chain, taken as a whole, showed certain peculiarities. Certain stretches of proglottides were narrow and long. These were followed by "island"-like broad stretches, where the segments were shorter and more numerous—two to three

Fig. 2.

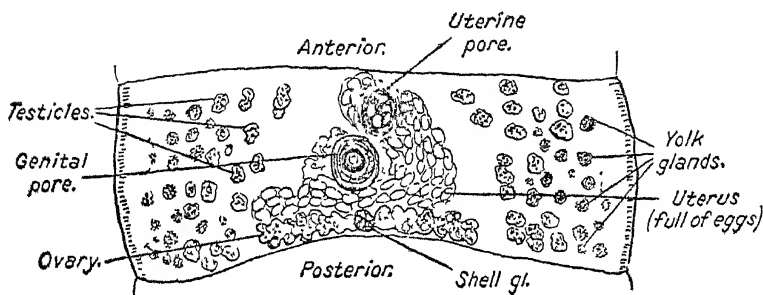
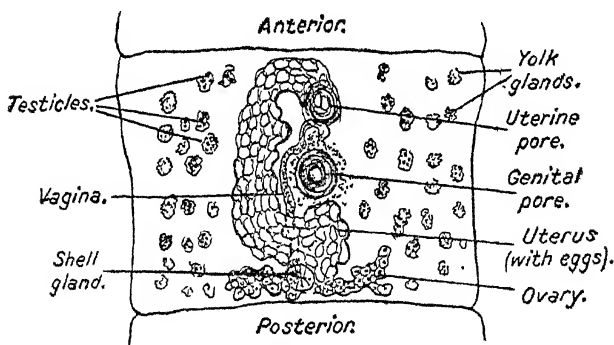


Fig. 3.



to the millimetre. Generally the segments were 1 mm. long. In the "ripe" proglottides the dorsal surface was convex and the ventral flat—a condition brought about by the bulging uterus.

#### *Internal Anatomy.*

The specimens were stained in hæmatoxylin. A few transverse sections were made. In both cases, however, the greatly developed uterus obscured most of the structures.

I was able, by examining several transverse sections, to construct a transverse section representing the position of the genitalia. In the figure the genital pore and ovary are, of course, not in the same plane, but put in for convenience' sake (fig. 3).

Fig. 4.

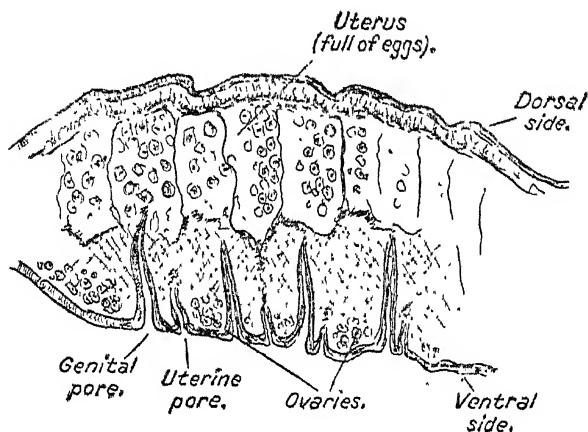
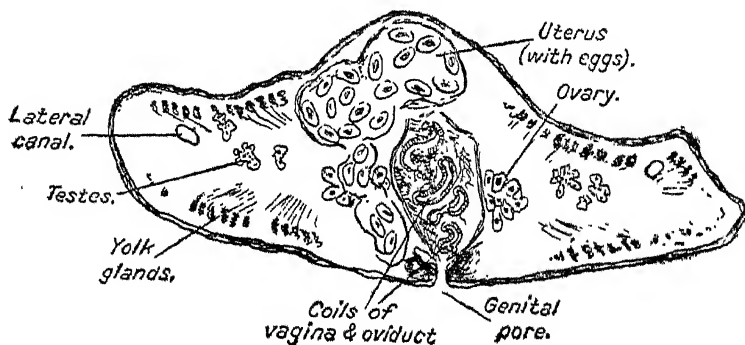


Fig. 5.



*Testicles.*—The testes were found to be distributed in the lateral regions of the segments, and more or less dorsally. I was not able to trace any ducts.

*Ovary.*—In every case the ovary was found to be situated at the posterior margin of each segment. It occupied a

linear position, and was grape-like. Near the middle of the ovary I was able to identify a more darkly stained globular shell-gland. The ovary is medial, posterior, and ventral in each segment (fig. 4).

In a few segments I was able to trace a thick duct, which I believe to be the vagina. From the stained specimens nothing more was recognizable. From a few transverse sections indications of a coiled condition were visible (fig. 3).

The genital opening was ventral and median. The pore was surrounded by muscles, and the deeply stained area under it suggested a cirrus.

I found no separate opening for the vagina, so I concluded it opened together with the cirrus into a genital atrium (fig. 4).

*Uterus.*—The uterus appeared to be sac-like and distended. In every segment it was located more dorsally, causing a "bulging" of the dorsal surface.

It was situated, now on the right of the genital pore, with its convexity to the right, and now to the left, with the convexity to the left. This condition alternated irregularly. In nearly all my stained segments and transverse segments the uterus was distended and filled with eggs. In some of the stained segments the beginnings or "aulagen" of the uterus showed up as stained curves either to the right or to the left of the genital pore. There was a separate uterine pore in every ripe segment. This aperture was situated at the anterior portion on the ventral surface, and displaced slightly to the left or to the right of the genital pore and the median line—a condition depending upon the position of the uterus (fig. 5).

#### *Vitelline Glands.*

These were confined to the lateral fields of the segments, and more or less in parallel rows. Transverse sections showed them to be situated near the dorsal and ventral surfaces respectively (fig. 4).

Lateral canals were visible as two longitudinal stained lines in the immature segments. In the sections they were not always visible, as they were small. In some they appeared laterally as two narrow ducts. I was unable to trace any transverse canals either in the stained segments or in the few sections.

Chalk bodies were visible, especially in the sections, as numerous refringent granules in the body-wall.

XXIX.—A Subdivision of the Genus *Uromys*.

By OLDFIELD THOMAS.

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THE genus *Uromys*, which ranges from the Moluccas through New Guinea and the Solomon Islands to North Australia, has long been known to fall naturally into two very distinct groups. These have been by myself spoken of as the large species allied to *U. macropus* and the small ones allied to *U. bruynii*. Now, however, in connection with the working out of some New Guinea mammals, I have had occasion to examine them more closely, and find that the differences are such that these groups may very well be treated as genera. In addition, the remarkable species *U. sapientis* of the Solomon Islands would seem also to deserve generic separation.

The three genera may be distinguished as follows:—

- A. Skull with projecting zygomatic plate. Bullæ very small, little inflated. Mesopterygoid fossa broad anteriorly, the palatal edge level with or behind  $m^3$ .
  - a. Size large, hind foot 52 mm. and upwards, skull-length 60 mm. and upwards. Tail long, commonly with contrasted white tip. Palatine foramina very short, their length not more than the distance from their hinder end to  $m^1$ . Back of palate behind level of hinder edge of  $m^3$ . Incisors very deep in proportion to their breadth, the depth of the lower ones equalling the combined breadth of the pair. Palate-ridges, where known, consisting of a large number (12 or more) of fine interdental ridges\*, besides the usual premental ridges ..... I. *Uromys*, Peters.  
 Synonym: *Gymnomys*, Gray.  
 Genotypes of both names: *U. macropus* †, Gray.  
 Range: New Guinea, Aru Islands, and N. Queensland.  
 Species described: *anak*, *aruensis*, *macropus*, *multiplicatus*, *nero*, *papuanus*, *rothschildi*, *scaphar*, *validus*.
  - b. Size smaller, the largest with hind foot 43 mm. and skull 51 mm., but the majority far smaller. Tail usually shorter than in *Uromys*, though occasionally long, either wholly black, or lighter below, but not known

\* As figured by Jentink, 'Nova Guinea,' v. pl. xvi. fig. 6.

† Palmer erroneously gives *celebensis* as the genotype of *Gymnomys*; but a reference to P. Z. S. 1867, p. 597, paragraph 5, will show that the genotype is "*Mus macropus*."



to have an abruptly white tip. Palatine foramina not so short as in *Uromys*, their length approximating to once and a half the distance from their hinder end to the molars. Mesopterygoid fossa broad anteriorly; back of palate about at level of  $m^3$ . Incisors normal, not specially deep in proportion to their breadth, the depth of the lower ones not equalling the combined breadth of the pair. Palate-ridges, where known, consisting of about 5 or 6 interdental ridges in addition to the simple pre dental ones \* . . . . .

II. *Melomys*.

Genotype. *M. rufescens*† (*Uromys rufescens*, Alst.).

Range: Melanesia in a broad sense—from the Talaut Islands and Moluccas through New Guinea to the Solomon Islands, and southwards to North Australia.

Species described: *aerosus*, *arcium*, *bruijnii*, *calidor*, *caurinus*, *cervinipes*, *fraterculus*, *fulgens*, *gracilis*, *leucogaster*, *levipes*, *lorentzi*, *lutillus*, *melicus*, *mollis*, *moncktoni*, *murinus*, *musavora*, *musculus*, *naso*, *obiensis*, *platyops*, *porculus*, *rufescens*, *stulkeri*, *talauudum*.

B. Skull with zygomatic plate scarcely projecting.

Bullae comparatively large, inflated. Mesopterygoid fossa narrowed anteriorly to a point, which is level with the hinder edge of  $m^2$ .

- a. Size of the single species rather large. Tail medium, wholly black. Palatine foramina about as in *Melomys*. Incisors broad and stout, the lower ones not deep in proportion to their width. Palate-ridges not known . .

III. *Solomys*.

Genotype and sole species: *S. sapientis* (*Uromys sapientis*, Thos.).

Range: Solomon Islands only.

XXX.—*New Mammals from New Guinea and neighbouring Islands.* By OLDFIELD THOMAS.

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By the kindness of Dr. W. K. Dammerman of Buitenzorg I have been entrusted with the examination of the considerable number of Papuan mammals in the Museum under his care, the majority of them coming from recent expeditions to New Guinea, notably that of 1920 to the Mamberano-Idenburg region of N. New Guinea, carried out by Mr. W. C. van Heurn.

\* As figured by Jentink, *tab. cit.* fig. 3.

† Chosen because I happen to be able to check the number of palate-ridges in one of the typical specimens.

A full list of the mammals will in due course appear in 'Nova Guinea,' but in the meantime it seems advisable to publish preliminary diagnoses of the new forms.

By the generosity of the authorities at Buitenzorg, the types of the new species are presented to the British Museum.

*Nyctimene celeno*, sp. n.

A large species related to *N. aello*, with similar broad dorsal band, but rather smaller, and of browner coloration.

Forearm 83 mm. Skull, greatest length 36.5.

*Hab.* North New Guinea.

*Type.* Adult male. B.M. no. 22. 2. 2. 2.

*Rattus mordax tramitius*, subsp. n.

Like true *mordax*, but colour blackish grey, without fulvous suffusion.

Head and body 175 mm.; tail 170; hind foot 35.5. Skull-length 41.5.

*Hab.* Doormanpad-bivak, N. New Guinea (*W. C. van Heurn*).

*Type.* Female. B.M. no. 22. 2. 2. 13. Original number 86.

*Rattus cœnorum*, sp. n.

Like *R. mordax*, but larger, stouter, with heavier feet and skull.

Head and body 207 mm.; tail 230; hind foot 44. Skull-length 47.

*Hab.* Pionier-bivak, Mamberano River (*W. C. van Heurn*).

*Type.* Male. B.M. no. 22. 2. 2. 19. Original number 26.

*Rattus bandiculus*, sp. n.

A clumsy, heavily built rat, still larger than *cœnorum*.

Head and body 252 mm.; tail 220; hind foot 49; skull-length 54.

*Hab.* Pionier-bivak, Mamberano River (*W. C. van Heurn*).

*Type.* Old male. B.M. no. 22. 2. 2. 22. Original number 25.

*Stenomys* \* *arrogans*, sp. n.

A medium-sized species, with a remarkably swollen brain-case.

Head and body 120 mm.; tail 125; hind foot 25.5. Skull, length 34, breadth of brain-case 15.5.

*Hab.* Doormanpad-bivak, 2400 m. (*W. C. van Heurn*).

*Type.* Female. B.M. no. 22. 2. 2. 24. Original number 196.

*Melomys rattoides*, sp. n.

A large species, with close glossy fur and long slender skull.

Head and body 210 mm.; tail 160; hind foot 41. Skull-length 48.5.

*Hab.* Mamberano River (*W. C. van Heurn*).

*Type.* Male. B.M. no. 22. 2. 2. 25. Original number 22.

*Melomys lanosus*, sp. n.

A soft-haired species, rather smaller than *rattoides*. Colour greyish.

Head and body 175 mm.; tail 143; hind foot 36.5. Skull-length 42.

*Hab.* Doormanpad-bivak (*W. C. van Heurn*).

*Type.* Female. B.M. no. 22. 2. 2. 27. Original number 190.

*Melomys ruber*, sp. n.

Size small. General colour rufous. Under surface washed with pale rufous-grey, no hairs white to the base.

Skull slender, smooth, not ridged.

Head and body 132 mm.; tail 130; hind foot 29. Skull-length 34.2.

\* A new genus related to *Stenomys* is:—

## NESOROMYS, gen. nov.

Genotype: *N. ceramicus* (*Stenomys ceramicus*, Thos. Ann. & Mag. Nat. Hist. (9) vi. p. 425, 1920).

Distinguishable from *Stenomys* by long narrow muzzle; palate extended backwards nearly halfway from back of *m*<sup>3</sup> to front of bulla; palatal foramina far forward in front of molars; masseteric knob nearly halfway up the front edge of the zygomatic plate; and with unusually formed pterygoids.

The peculiar characters of the Ceram representative of *Stenomys* were not sufficiently appreciated when I described the species, and I now think it should form a special genus.

*Hab.* Doormanpad-bivak, N.W. New Guinea (*W. C. van Heurn*).

*Type.* Male. B.M. no. 22. 2. 2. 44. Original number 90.

*Hydromys esox illuteus*, subsp. n.

Like *esox*, but greyer and less suffused with fulvous.

Head and body 260 mm.; tail 215; hind foot 50.5.  
Skull-length 48.5.

*Hab.* Idenburg River (*W. C. van Heurn*).

*Type.* Male. B.M. no. 22. 2. 2. 61. Original number 15.

*Dorcopsis hageni caurina*, subsp. n.

Like *hageni*, but the colour browner and the sides as dark as the back.

Head and body 640 mm.; tail 440; hind foot 143. Skull-length 144.

*Hab.* Mamberano River (*W. C. van Heurn*).

*Type.* B.M. no. 22. 2. 2. 63. Original number 218.

*Dorcopsis vanheurni*, sp. n.

Allied to *D. macleayi*, but smaller and with finer, softer fur.

Head and body 390 mm.; tail 300; hind foot 100; ear 35.  
Skull-length 82.

*Hab.* Doormanpad-bivak (*W. C. van Heurn*).

*Type.* Adult female. B.M. no. 22. 2. 2. 64. Original number 16.

*Pseudochirus dammermani*, sp. n.

Smallest species of the genus; allied to *P. schlegeli*, but smaller, and with end of tail naked below; ears pale, not blackish.

Head and body (young) 152 mm.; tail 173. First two molariform teeth 6.

*Hab.* Dutch North New Guinea.

*Type.* Young. B.M. no. 22. 2. 2. 69. Original number 89.

*Peroryctes dorsalis*, sp. n.

Like *P. ornatus*, but the striping on head and rump practically confined to the median line; tail almost completely naked.

Head and body 270 mm.; tail 185; hind foot 54. Skull-length 63.

*Hab.* Doormanpad-bivak (IV. C. van Heurn).

*Type.* Female. B.M. no. 22. 2. 2. 74. Original number 12.

*Sminthopsis rufigenis*, sp. n.

A greyish species with conspicuously red cheeks, as in the much larger *S. virginiae* of Queensland.

Head and body 91 mm.; tail 102; hind foot 21.3. Skull 26.5.

*Hab.* Aru Islands.

*Type.* Female in spirit. B.M. no. 22. 2. 2. 76. Original number XX.

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XXXI.—A new Marmoset from the Lower Amazons.

By OLDFIELD THOMAS.

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AN examination of the Museum specimens of *Mystax ursulus* shows that those from the west side of the Tocantins River are definably different from those round Pará itself.

The new one may be called :—

*Mystax ursulus umbratus*, subsp. n.

Similar in essential characters to Pará *ursulus*, but darker throughout, the black shoulder-mantle extending further down the back—to halfway between shoulders and thighs—and the mottled part of the body grizzled finely with dull ochraceous instead of coarsely with buffy.

Dimensions of the type (measured in the flesh) :—

Head and body 230 mm.; tail 352; hind foot 68; ear 30.

Skull : greatest length 48.5; basal length 35; zygomatic breadth 34.

*Hab.* Lower Amazons west of the main Tocantins River; type from Cametá.

*Type.* Old female. B.M. no. 11. 4. 28. 4. Original number 31. Collected 20th January, 1911, by Fräulein Dr. E. Suetlège. Presented by the Goeldi Museum, Pará.

*Ann. & Mag. N. Hist.* Ser. 9. Vol. ix. 18

This is no doubt the form of *M. ursulus* which inhabits the forest-region to the west of the Tocantins River, while the Pará area to the east of that river is the locality of the true *ursulus*.

Hoffmannsegg was said to have received his original specimens from near the mouth of the Tocantins, a statement which might give rise to confusion. But it appears that the word Tocantins is equally applied to the broad estuary which runs north-eastwards past Pará and the narrower river which runs northwards, nearly at right angles to the other, separating the district in which Cametá stands from the true Pará region. The latter is the home of *ursulus*, the former that of *umbratus*.

### XXXII.—*The Generic Classification of the Taphozous Group.* By OLDFIELD THOMAS.

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WHEN, in 1915, I wrote my "Notes on *Taphozous* and *Succolaimus*"\*, and recognized the latter as a distinct genus from the former, as had Hollister previously under another name, I did not sufficiently weigh the characters which separate *Taphozous nudiventris* and its allies from the typical members of *Taphozous*.

On reconsidering the subject, I now think that these remarkable half-naked bats should be separated as a distinct genus from the ordinary hairy species, and would suggest that the whole group might be synoptically arranged as follows:—

- A. Bullæ imperfect, the inner side of each incomplete. A radio-metacarpal pouch.
  - a. Frontal concave; upper profile of brain-case rising from it in a strong curve. Occipital "helmet" scarcely developed. Body haired as usual. . . . . I. *Taphozous*, Geoff.  
Genotype: *T. perforatus*, Geoff.
  - b. Frontal almost flat, the cranial profile scarcely rising above it behind. A strongly developed occipital helmet.

\* J. Bombay Soc. xxiv. p. 57 (1915).

Body partly naked behind, both above  
and below ..... II. *Liponycteris*, gen. nov.  
Genotype: *L. nudiventris* (*T. nudiventris*, Cr.).

B. Bullæ perfect internally. No radio-  
metacarpal pouch. Body hairy ..... III. *Saccolaimus*, Less.  
Genotype: *S. saccolaimus* (*T. saccolaimus*, Temm.).

Besides *nudiventris*, *Liponycteris* would contain only  
*lachhensis* and its two subspecies—*magnus*, Wettstein (1914,  
syn. *babylonicus*, Thos., 1915), and *nudaster*, Thos.

XXXIII.—*Preliminary Note on a new Genus of Scatopsid  
Flies from New Zealand.* By F. W. EDWARDS.

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AMONG a large collection of Tipulidæ recently sent me for study by Mr. G. V. Hudson, of Wellington, New Zealand, were several specimens of a very remarkable fly, which must be placed in a new genus of the family Scatopsidæ. I hope to give a detailed account of this fly in a future paper on the Mycetophilidæ, Bibionidæ, and Scatopsidæ of New Zealand, but, meanwhile, at Mr. Hudson's request, I offer preliminary diagnoses of the new genus and of three new species. The great interest of the new genus lies in the fact that its only relative (not a very close one) is *Corynoscelis*—a very rare fly, of which only a single species is known from Arctic Europe.

CANTHYLOSCELIS, gen. nov.

Resembles *Corynoscelis*, Bohemann, in wing-venation and in the strongly clubbed hind femora and curved hind tibiæ, but differs as follows:—Antennæ fully as long as the head and thorax together (rather longer in ♂ than in ♀), the joints well separated, with short pedicels, longer than broad, and somewhat flattened. Only two ocelli present, placed close together some little distance behind the eyes. Club of hind femora larger, occupying two-thirds of the segment. Claws much enlarged at the base, the enlargement bearing a row of fine teeth (♂ ♀). Empodia present, very large, broadening

apically (no pulvilli). Upper branch of the radial sector less transverse. Costa extending well beyond the tip of  $R_{4+5}$ . Bases of the lower branch of the media and of the anal vein defective. Cross-vein connecting  $R_s$  with  $Cu$  meeting  $Cu$  before the fork. Wing-membrane with numerous short macrotrichia.

Genotype: *C. antennata*, sp. n.

The flies are considerably larger than any European Scatopsid, and have some superficial resemblance to Mycetophilidæ of the genus *Leiomyia*. *Corynoscelis*, on the other hand, resembles the other European Scatopsidæ in size and appearance.

*Canthyloscelis antennata*, sp. n.

Antennæ black. Eyes in punctiform contact above the antennæ in the ♂, just separate in the ♀. Thorax with three rather distinct dark dorsal stripes, on a brownish-ochreous ground. Male claspers rather large, pointed, the basal half broad; ninth tergite with two sharp points. Hind femora pale yellowish on the basal half, including the commencement of the swollen portion; apical half brown, darker at the tip and at the junction with the pale portion. Hind tibia brown, with a more or less conspicuous yellowish ring occupying the middle third. First hind tarsal joint nearly cylindrical, about half as long again as the second. Coxæ all ochreous. Wings with a conspicuous dark band near the tip, somewhat crescent-shaped, with the convexity inwards. Wing-length 5-6 mm.

Wellington, N.Z., in forest, 14. xii. 1920 (*G. V. Hudson*); type and two other ♂ from Wainuiomata, also two ♂, two ♀ without exact data, in the British Museum; another ♀ in the Cambridge Museum.

*Canthyloscelis claripennis*, sp. n.

Antennæ brownish on the basal half or more, black apically. Eyes of ♂ separated by about the width of two ommatidia. Thorax indistinctly striped. Male claspers smaller than in *C. antennata*, rounded apically; ninth tergite simple. Hind femora with the dark colour more extensive, the pale yellow confined to the slender basal portion. Hind tibiæ without a distinct pale ring in the middle. First hind tarsal joint nearly cylindrical, about half as long again as the second.



Coxæ all ochreous. Wings perfectly clear. Wing-length 6 mm.

Type a single male presented by the collector, Mr. G. V. Hudson, to the Cambridge Museum in 1911, and by Dr. H. Scott to the British Museum in 1922. The specimen bears the number 136, but no data.

*Canthylloscelis nigricoxa*, sp. n.

Antennæ black. Eyes of ♂ just touching. Thorax brownish, unstriped. Legs uniformly ochreous-brown except for the paler base of the hind femora and the shining black hind coxæ. First hind tarsal joint somewhat swollen, only about three times as long as its greatest breadth, and slightly shorter than the second joint. Wings with a dark subapical patch on the costa, not reaching the hind margin. Wing-length 7.5 mm.

Type a single male presented by Mr. Hudson to the Cambridge Museum in 1911, and by Dr. H. Scott to the British Museum in 1922. The specimen bears the number 136 *a*, but no data. Mr. Hudson informs me that his first specimen of this genus was taken at Castle Hill, West Coast Road, South Island, N.Z., in January 1893. This may be the specimen he refers to.

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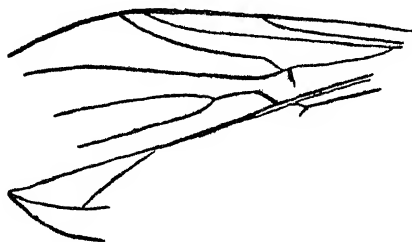
XXXIV.—*A Note on the Jurassic Dipteron, Platyura fittoni, Brodie.* By F. W. EDWARDS.

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*PLATYURA FITTONI* was named and badly figured by Brodie (Fossil Ins. pl. iii. fig. 9, 1845) from a specimen in the British Museum from the English Purbeck rocks. In 1856 Giebel (Ins. d. Vorwelt, p. 209) proposed the generic name *Adonia* for Brodie's figure. This name having been previously used, Handlirsch (Fossil Ins. p. 629, 1906) proposed to replace it by *Pseudadonia*. Later, Johannsen ('Genera Insectorum,' Mycetophilidæ, p. 84, 1908), still without examining the type-specimen, placed *Adonia* and *Pseudadonia* as synonyms as *Mycetophilites*, Förster, an Oligocene genus for which no type-species has been named.

During a recent investigation of the fossil Culicidæ in the

British Museum, I took occasion to examine the type of *P. fittoni* (B.M. reg. no. In. 12753). Moreover, I was fortunate enough to discover among some undetermined material the counterpart of the type, which is in rather better condition than the type itself. By a study of the two halves of the specimen, I was able to make out the wing-venation in some detail, as shown in the accompanying figure. Unfortunately the base and tip, as well as the lower half of one wing, are imperfect, and the second wing, which appears to be folded on itself, shows little or no structure. The portion of the wing preserved, however, shows clearly the tip of the long subcosta, the three-branched radius, and the two-branched media. The  $r-m$  cross-vein appears to be situated slightly before the fork of the radial sector, but is not very clearly marked. The upper branch of the sector ( $R_{2+3}$ ) is long and ends in the costa a very short distance beyond the tip of  $R_1$ .



*Mycetophætus (Platyura) fittoni* (Brodie). Wing of type.

The venation of *P. fittoni* as now ascertained has no resemblance to that depicted in Förster's figure (copied by Johannsen) of *Mycetophilites*. On the other hand, it agrees, so far as it is preserved, with that of the American Miocene genus *Mycetophætus*, Scudder (Bull. U.S. Geol. Surv. no. 93, p. 19, 1892). This genus was referred by Johannsen to the subfamily Boltophilinæ, but it does not fit in well with the recent members of this subfamily on account of the long upper branch of the radial sector, which gives it a rather striking resemblance to some of the Anisopodidæ, such as *Mycetobia*. The position of the  $r-m$  cross-vein before the fork of  $R_s$  would seem to exclude *Mycetophætus* from the Anisopodidæ, but it may, perhaps, be regarded as an archaic form intermediate between this family and the *Mycetophilidæ*.

XXXV.—*Exotic* Muscaridæ (*Diptera*).—V.\*

By J. R. MALLOCH, Washington, D.C.

Subfamily *PHAONINÆ*.Genus *EUPHAONIA*, nov.

*Generic characters*.—Arista pubescent; eyes hairy; frons of female with a strong pair of cruciate bristles; upper orbital directed backward and outward, second directed inward. Thorax with strong presutural acrostichals; prealar very long; prosternum, pteropleura, and hypopleura bare. Hind tibia with calcar. First posterior cell not narrowed apically.

Genotype, the following species.

*Euphaonia fulvohumeralis*, sp. n.

*Female*.—Metallic dark blue. Head black, opaque, orbits and face with whitish pruinescence. Thorax not vittate; humeri and region immediately surrounding them and a streak from them to bases of wings reddish fulvous; scutellum slightly violaceous on disc. Abdomen unmarked. Legs black. Wings greyish. Calyptreæ brown. Knobs of halteres fuscous.

Eyes short-haired; frons one-third of the head-width; orbits without forwardly directed bristle at middle; parafacial linear; cheek as high as width of third antennal segment, the latter 1.5 as long as second segment; pubescence of arista not longer than its basal diameter. Thorax with two pairs of strong presutural acrostichals; postsutural dorso-centrals 4; posthumeral and presutural bristles duplicated; scutellum not haired below; sterno-pleurals 1:2. Fore tibia with one antero-dorsal and one posterior bristle; mid-tibia with about six posterior bristles; hind femur with about three preapical antero-ventral bristles; hind tibia with four or five antero-ventral setulæ and three antero-dorsal bristles, calcar long, apical postero-dorsal bristle minute. Outer cross-vein straight.

Length 6 mm.

*Type*, Port Famine, Tierra del Fuego, South America (*Charles Darwin*).

\* For Part IV., see Ann. & Mag. Nat. Hist. (9) viii., Oct. 1921, pp. 414-425.

## Genus METOPOMYIA, nov.

*Generic characters.*—Related to *Helina*, R.-D. Differs in having the pteropleura hairy, and the ventral surface of the scutellum with fine sparse hairs as in *Anthomyiinae*. The hind tibia has no calcar, but there are one or two short bristles on the postero-dorsal surface. The wing-veins are bare and the fourth vein is not curved forward at apex. The prosternum and propleura are bare, the prealar bristle is long, there are no strong presutural acrostichals present, the eyes are bare in both sexes, and the frons is as in typical species of *Helina*.

Genotype, the following species.

*Metopomyia atropunctipes*, sp. n.

*Male and female.*—Shining testaceous yellow. Antennæ brownish, third segment black; palpi brownish yellow, fuscous apically. Dorsum of thorax with two faint reddish vittæ, a small blackish spot above the propleural bristle, and a fuscous streak from humeral angle to base of wings which extends narrowly on to dorsum and more broadly over pleura. First tergite (sec. ver.) with a large fuscous spot on each side, third and fourth largely infuscated in male, less noticeably so in female. Apices of femora with a broad, sharply defined, black band, apices of tibiæ less deeply infuscated, their bases more or less browned; tarsi fuscous. Wings clear, extreme base of costa, humeral cross-vein, first vein opposite humeral, and the base of third vein brown or fuscous. Calyptre and halteres yellowish.

*Male.*—Narrowest part of frons about equal in width to anterior ocellus, the silvery orbits contiguous at middle; parafacial narrower than third antennal segment; cheek fully twice as high as width of third antennal segment; vibrissal angle produced well beyond base of antennæ, a few setulæ above vibrissæ; longest hairs on arista subequal in length to width of third antennal segment. Thorax with four pairs of postsutural dorso-centrals. Abdomen ovate; sides of first tergite at blackened area with rather dense, moderately long, black bristles; fifth sternite with a broad, shallow, rounded posterior emargination. Legs slender; fore tibia unarmed at middle; fore tarsi slender, longer than fore tibiæ, basal segment without long, slender, erect, sensory hairs; mid-femur with a series of fine erect hairs on basal half or more of postero-ventral surface; mid-tibiæ with two

posterior bristles; hind femur with a complete series of antero-ventral bristles and a series of finer bristles on basal half of postero-ventral surface; hind tibia with one or two antero-ventral, two antero-dorsal, and two postero-dorsal bristles. Outer cross-vein much curved.

*Female*.—Frons a little less than one-third of the head-width, orbits narrow. Mid and hind femora lacking the postero-ventral series of fine bristles.

Length 7–8 mm.

*Type*, male, and allotype, Victoria, Australia (*C. French*).

#### Genus DIMORPHIA, nov.

*Generic characters*.—Similar to *Muscina*, R.-D., in general habitus. Prothorax, pteropleura, hypopleura, declivous postero-lateral part of mesonotum, and ventral surface of scutellum bare. Cephalic characters as in *Helina*, R.-D. Arista plumose. Hind tibia without calcar on postero-dorsal surface and no setulæ on that surface. Anterior intra-alar bristle present but weak in female, absent in male; scutellum elongated, subtriangular; prealar short, but strong. Abdomen ovate. Base of auxiliary vein, stem of veins 2+3 above and below, and vein 3 for a variable distance beyond the furcation setulose in both sexes, and fourth vein setulose on the greater portion of its length above and below in female, rarely sparsely setulose in male; fourth vein distinctly curved forward at apex.

Genotype, *Cyrtoneura flavicornis*, Macquart.

One other described species known to me, *Anthomyia tristis*, Wiedemann (*Spilogaster laterittata*, Bigot, *Anthomyia subpunctata*, Walker), belongs to this genus. It has the antennæ and palpi black or fuscous, while *flavicornis* has both yellow.

Stein lists four species with the name *flavicornis* in his composite genus *Mydaea* in his recent catalogue of the world's species of Anthomyiidae. Not one of the species so listed was described in that genus, and but one, *flavicornis*, Coquillett, belongs to the genus *Mydaea* in the strict sense.

I have before me specimens of *tristis* from British East Africa and Natal, and of *flavicornis* from the same localities and from north of Mt. Kenia.

In addition to the foregoing I have what appears to be an undescribed species of the genus, closely related to *flavicornis*, which is briefly characterised below.

*Dimorphia flavithorax*, sp. n.

*Female*.—Head black, face brownish, frons with grey pruinescence, face silvery; antennæ and palpi yellow, but not so clear as in *flavicornis*. Thorax entirely yellow, the dorsum with the vittæ indicated by whitish pruinescence, which is visible anteriorly when viewed from above and behind. Abdomen yellow, largely infuscated above. Legs yellow, tarsi brownish. Wings slightly yellowish. Calyptreæ and halteres yellow.

Frons a little less than one-third of the head-width; longest hairs on arista about twice as long as width of third antennal segment. Fore tibia without a median bristle; mid-tibia with two or three posterior bristles; hind tibia with one antero-ventral and one antero-dorsal bristle. Apex of first posterior cell nearly as wide as that cell at outer cross-vein.

Length 6–8 mm.

*Type*, Malvern, Natal, vi. 1897 (*G. A. K. Marshall*). Paratype, Masai Reserve, B.E.A., 13. v. 1913 (*T. J. Anderson*).

The first posterior cell in *flavicornis* is much narrower at apex than in *flavithorax*; in *tristis* it is about as wide as in the latter.

*Helina*, Robineau-Desvoidy.

It appears to me pertinent to indicate that the above generic name is that which covers most of the exotic Muscaridæ described by Stein as belonging to the genus *Mydæa*. The latter genus when limited in scope to contain only those species which agree in characters with the genotype, *pagana*, Fabricius, is found to be confined to the northern half of the two hemispheres—at least, so far as I have been able to discover. The closely related genus *Myiospila*, R.-D., which is doubtfully distinct, occurs much farther south; I have seen species of this genus from Australia and South America. Many of Stein's species originally described in *Mydæa* do not find their true affinities in *Helina* either, and new genera have been erected for their reception, some of them in this series of papers.

*Helina fuscoflava*, sp. n.

*Female*.—Head testaceous yellow, frons red, upper half velvety black, orbits greyish pruinose; third antennal segment black, except at base; palpi rufous. Thorax

testaceous yellow, with three broad brownish-red vittæ, which become fuscous posteriorly, the median one continued over disc of scutellum; pleura with a fuscous streak on upper margin from humeri to base of wings. Abdomen dark brown, paler on sides of tergites anteriorly, the dorsum with slight grey pruinescence, which is most distinct on the centre in the form of a slender vitta when seen from behind. Legs pale yellow, apical third of each femur and all of the tarsi black. Wings yellowish, veins dark brown, cross-veins not noticeably infuscated. Calyptreæ and halteres yellow.

Eyes bare, separated by a little less than one-third of the head-width; orbits narrow, frontal bristling normal; parafacial linear; check as high as width of third antennal segment, the latter about three times as long as second; arista plumose; palpi slender. Thorax with four pairs of postsutural dorso-central bristles, no presutural acrostichals well developed, and a moderately long prealar bristle; sternopleurals 1:2. Abdomen ovate, pointed apically. Fore tibia without median bristles; fore tarsus slender, longer than tibia; mid-tibia with two posterior bristles; hind femur with one preapical antero-ventral bristle; hind tibia with one antero-dorsal and one antero-ventral bristle. Wings rather broad, first posterior cell widened apically, last section of fourth vein about 1.5 as long as penultimate section, the latter not much longer than outer cross-vein.

Length 5.5 mm.

*Type*, Mt. Wellington, Tasmania, 3. x. 1912 (*A. White*).

This species closely resembles *Metopomyia atropunctipes*, described in this paper, in colour, the markings of the legs being very distinctive.

*Helina pellucidiventris*, sp. n.

*Male and female*.—Head fuscous; frons, face, and cheeks densely white pruinescent, almost silvery; antennæ entirely yellow, third segment infuscated except at apex; palpi luteous. Thorax densely grey pruinescent, with faintly indicated vittæ in front of suture; humeri and apex of scutellum faintly yellowish in male, conspicuously so in female. Abdomen testaceous yellow, opaque, with a brown or fuscous vitta, which may be complete or incomplete, and a pair of spots on second and another on third tergite of same colour, and sometimes a minute pair on fourth. Legs testaceous yellow, slightly darkened. Wings clear, yellow

at bases, cross-veins, very indistinctly clouded. Calyptræ and halteres yellowish.

*Male*.—Eyes bare, separated by more than twice the width of third antennal segment; orbits setulose to middle, wider than narrowest part of interfrontalia; ocellars very long; parafacial almost linear; cheek higher than width of third antennal segment, the latter nearly twice as long as second segment; longest hairs on arista as long as width of third antennal segment. Thorax with three pairs of dorso-centrals behind suture; prealar absent; sterno-pleurals 2:2; hypopleura bare; presutural acrostichals short but distinct; both intra-alars long. Abdomen elongate-ovate; fifth sternite with a rather deep excision; basal sternite bare. Fore tibia without a median bristle; mid-femur with a series of bristles on basal half of postero-ventral surface; mid-tibia with two or three posterior bristles; hind femur with a few bristles on apical half of antero-ventral surface and one or two shorter bristles on basal half of postero-ventral; hind tibia with one antero-ventral and two antero-dorsal bristles. Outer cross-vein slightly curved.

*Female*.—Frons almost one-third of the head-width at vertex, widened anteriorly.

Length 6 mm.

*Type*, male, allotype, and six male paratypes, Kasauli, North-west India (*F. Wyville-Thomson*).

Attached to one specimen is a MS. label as follows:—  
“Caught in enormous numbers in houses here in the dry hot weather. They sat quietly on walls, beds, etc., and did not bother one, going out at sunset and coming in in the morning.”

Belongs to the same group as *duplicata*, Meigen, but I know of no allied species having the same habits.

#### *Helina lucida* (Stein).

*Mydæa lucida*, Stein, Ann. Nat. Mus. Hungar. xi. p. 493 (1913).

This species and the next one belong to a group closely allied to the preceding one, the abdomen being largely yellowish pellucid with similar black marks, but both have the thorax with conspicuous black marks and the eyes of the male are more widely separated, the frons being distinctly wider than the width of the third antennal segment. The postsutural transverse black fascia on thorax in *lucida* is entire, while in the next species it is more or less distinctly interrupted on each side of the median line, the fascia



resembling three large spots. The anterior margin of thoracic dorsum in this species has only the submedian pair of black spots present, while in *fasciata* there are four black spots present.

Localities: three males, Benguella, Angola, S.W. Africa, 300 miles from coast, xii. 1904 (Dr. F. C. Wellman); one male, Bihé, Angola, xii. 1903—iii. 1904 (Dr. F. C. Wellman); one male and one female, Ruwe, Congo Free State. 4 & 8. v. 1907 (Dr. A. Yale-Massey).

One of the Benguella specimens bears a manuscript-label as follows: "Very sluggish, sylvan, but often seen on outside of native kraals, etc."

It is possible that this insect has similar habits to the preceding one, and is more active after sundown than through the day. Ordinarily the related species are—at least in temperate regions—exceedingly active during the daytime and are difficult to approach.

The Ruwe specimens were taken "in houses" (MS. note attached to specimens).

*Helina fasciata* (Jaennicke).

*Spilogaster fasciata*, Jaennicke, Neue Exot. Dipt. p. 370 (1866).

Two males and one female, Lagari, B.E.A. (C. S. Betton). No indication is given as to the habits of this species.

Genus DARWINOMYIA, nov.

*Generic characters*.—Related to *Phaonia*; differs in having the frons of the female with a pair of strong cruciate bristles, the genital apparatus of the same sex with numerous stiff, erect, setulose hairs, and the hind tibia in both sexes with several bristles basad of the calcar on the postero-dorsal surface. From *Trichopticus*, Rondani, it differs in having the hind coxæ bare at apices above. From *Dendrophæonia*, Malloch (genotype *querceti*, Bouché) it differs in having the forwardly directed orbital bristle absent in female and the cheek without a strong upwardly directed bristle in the male. The male resembles the stout forms of *Trichopticus* (= *Lasiops*, Meigen) in habitus, but, as pointed out above, there are no setulose hairs at apices of hind coxæ above. The wing-veins are bare and the first posterior cell is not narrowed at apex.

Genotype, the following species.

*Darwinomyia univittata*, sp. n.

*Male and female*.—Head yellowish red, occiput infuscated, the interfrontalia in female red; orbits greyish; third antennal segment slightly darkened apically; palpi yellow. Thorax yellowish red, mesonotum with a broad black central vitta; propleura below, mesopleura, and pteropleura blackened; centre of metanotum black. Abdomen black or fuscous, male with a luteous mark on each side of basal (second) tergite. Legs reddish yellow, fore femora, apical half of hind femora, and the tarsi infuscated in both sexes, hind tibiæ infuscated basally in male. Wings clear, yellowish at bases. Calyptræ and halteres yellow.

*Male*.—Eyes short-haired, separated by little more than width of anterior ocellus; orbits setulose almost to anterior ocellus; parafacials linear; cheek higher than width of third antennal segment; arista with very short pubescence; palpi slender. Thorax with three pairs of very long presutural acrostichal bristles; prealar long; postsutural dorso-central bristles 4; hypopleura with some fine hairs on upper margin in front of spiracle; venter of scutellum bare. Abdomen ovate, basal sternite bare; ventral hairs very long; hypopygium small; fifth sternite with a small rounded posterior excision. Fore tibia with one antero-dorsal and one posterior bristle; fore tarsus slender, longer than tibia, without long sensory hairs along posterior side of basal segment; mid-femur with a group of erect fine hairs before middle on anterior surface, and beyond them the same surface is furnished with microscopic erect hairs which become stronger towards the apex, finally assuming the proportion of short spines, same femur with two strong bristles basad of middle and about seven weaker bristles on apical half of postero-ventral surface; mid-tibia with four or five postero-dorsal and four or five postero-ventral bristles; tarsus normal, hind femur slightly curved, with about five bristles on apical half of antero-ventral surface, the postero-ventral surface bare; hind tibia curved, the calcar distinct, antero-ventral, antero-dorsal, and postero-dorsal surfaces each with a series of long hairs, those on the antero-dorsal surface strongest, apical postero-dorsal bristle indistinguishable. Wing slightly pointed; outer cross-vein slightly curved.

*Female*.—Frons one-third of the head-width, orbits narrow; setulæ continued considerably above vibrissæ. Thoracic bristles much shorter and stronger than in male; genital

processes stout; some strong but short bristles on dorsum besides the erect stiff hairs.

Length 7.5–8 mm.

*Type*, male, Valle del Lago Blanco, Chubut, Patagonia (*J. Koslowsky*). Allotype, Port Famine, Tierra del Fuego (*Charles Darwin*). One female paratype, Valparaiso, Chile (*Charles Darwin*).

This species is a very striking one, both as to colour and structure. It would undoubtedly be placed in *Lasiops* or *Phaonia* by other authors, but my recent diagnostic work on this family has convinced me that such a course is not permissible, and I therefore erect for its reception a new genus which I have dedicated to the honour of the collector of the females above listed.

The genus *Phaonia* finds its greatest development in the northern half of both hemispheres, there being comparatively few species even doubtfully referable here in the southern half of either, and *Lasiops* is entirely northern so far as I know now.

#### Subfamily LISPINÆ.

This subfamily, which is distinguished from its allies by having the palpi flattened and dilated at apex and the pteropleura with some erect hairs in centre, as well as the eyes widely separated in both sexes, is widely distributed, occurring in every faunal region in the world. There are about 150 species described, the greater number occurring in the Palearctic region and in Africa, while there are but four described from South America. Only one genus is represented, but there are some very aberrant forms, if we accept the genotype as the criterion of the genus. One of the most aberrant species known to me I have in this paper used as type of a new subgenus.

#### Subgenus XENOLISPA, nov.

*Subgeneric characters*.—This subgenus differs from *Lispa* (sens. str.) in having the sternopleura with but one bristle, on the upper posterior angle. The presence of but one pair of postsutural dorso-central bristles and the absence of long bristles on the postero-ventral surface of the fore femur, as well as the distinct narrowing of the first posterior cell of the wing, serve to distinguish the subgenus from most of the species of *Lispa*.

Genotype, the following species.

*Xenolispa atrifrontata*, sp. n.

*Female*.—Black, shining. Frons black, face and cheeks with dense white dusting, which extends on orbits a little above the bases of antennæ; antennæ black; palpi yellow. Dorsum of thorax and scutellum almost glossy unicolorous black, pleura densely grey-pruinescent, opaque. Abdomen shining black, first tergite with three faint grey-pruinescent spots, one in centre and the others on each side of dorsum near posterior margin; second tergite with a grey central spot and a fainter one on each side at the middle on the lateral curve of segment; third tergite marked as second, but the spots much larger; fourth tergite with a grey spot on each side of dorsum. Legs black, grey-pruinescent. Wings hyaline, veins black. Calyptreæ white. Halteres yellow.

Ocellar bristles microscopic; arista plumose; parafacial with a single series of hairs; vibrissæ of moderate length; antennæ distinctly shorter than face. Thorax with only one pair of dorso-centrals; sterno-pleura with only one long bristle; scutellum with four subequal bristles. Fore femur with three or four short bristles at apex on postero-ventral surface, otherwise unarmed; fore tibia without a median bristle; mid-tibia with one posterior bristle; hind femur slender, unarmed; hind tibia with one weak postero-dorsal bristle. First posterior cell distinctly narrowed at apex.

Length 4 mm.

*Type*, South Queensland, Australia (*Dr. T. L. Bancroft*).

*Xenolispa niveimaculata* (Stein).

Two specimens, Obuasi, Ashanti, Africa, 18.vii. and 17.viii. 1907 (*W. M. Graham*).

*Lispa nivalis*, Wiedemann.

One specimen from Obuasi, Ashanti, Africa, and a series from Zungeru, Northern Nigeria.

*Lispa pectinipes*, Becker.

One female, Obuasi, Ashanti, Africa, 18.iv. 1906 (*W. M. Graham*); one female, near Cairo, Egypt, ii. 1902 (*P. P. Graves*).

*Lispa armipes*, Becker.

One male, Sekondi, Ashanti, Africa, 19.ix. 1906 (*W. M. Graham*).

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XXXVI.—*Papers on Oriental Carabidæ.*—VII.  
By H. E. ANDREWES.

IN this paper I am dealing with the Indo-Chinese species of the following genera :—*Diplochila*, *Hypolithus*, *Dioryche*, and *Miscelus*. I describe six new species, and add notes on all the other species hitherto described, together with a key under each genus, as an aid to identification. I have had the advantage of studying the material in the British, Paris, and Brussels Museums, and also the extensive collections recently made in Indo-China by Mr. R. Vitalis de Salvaza. For the loan of various types I have to thank Dr. R. Gestro and Messrs. Severin, Lesne, and Fleutiaux, whose kind assistance has greatly facilitated my work.

My notes on *Miscelus* extend to species found elsewhere than in Indo-China, as I found it convenient to deal with all of them now.

Genus DIPLOCHILA.

*Diplochila pinodes*, sp. n.

Length 26–27 mm. ; width 10·0–10·5 mm.

Black, dull above, moderately shiny beneath, the pubescence of the antennæ golden-yellow.

Head (4·5 mm. wide) depressed in front, surface minutely punctate, with a few irregular striæ, longitudinal at sides,

*Ann. & Mag. N. Hist.* Ser. 9. Vol. ix.

19

transverse on neck, two supraorbital pores, labrum small, moderately emarginate (for the genus), clypeus deeply emarginate, exposing basal membrane of labrum.

Prothorax a little transverse ( $5.75 \times 7.0$  mm.), contracted much more in front than behind, base bisinuate with oblique sides, apex emarginate, sides evenly rounded, not sinuate behind, with a well-marked border, slightly reflexed, increasing in thickness from apex to base, hind angles obtuse and a little rounded, basal foveæ obsolescent behind, but forming in front two deep punctures, at some distance from base, surface covered with faint transverse striæ, longitudinal along middle of base and apex; lobes of mentum rounded at apex, a pair of setæ at the middle of the emargination, a distinct sinus between the apex of ligula and the paraglossæ, right mandible with a strong tooth at middle, left one edentate.

Elytra ( $10.0 \times 15.0$  mm.) rather flat, very slightly dilated behind, border rounded at shoulder but not crenulate, striæ fine but sharply incised, with numerous fine but distinct punctures, a well-marked scutellary stria, intervals slightly convex, faintly shiny along median line, 9 and marginal channel finely rugose.

Underside nearly smooth, metepisterna finely rugose-punctate, sides of venter finely strigose. On the last segment in the ♂ there are two setæ on each side close together; in the ♀ there are three on each side, two close together (as in ♂), and a third near apex (in one of the three ♀♀ there are four setæ on each side).

Allied to *D. zeelandica*, Redt., but slightly larger. Head with thicker antennæ; prothorax wider, much more contracted in front, sides without trace of sinuation behind, border thicker behind, basal foveæ similar but deeper; elytra with much finer and more clearly punctured striæ, intervals flatter, border rounded at shoulder.

Annam: Hué (type). Tonkin: Hanoi and Vietri. 5 ex., ♂ ♀ (*R. Vitalis de Salvaza*). The type is in the British Museum.

*Diplochila lævigata*, Bates, Ann. Mus. Civ. Gen. 1892, p. 326.

*Rembus politus*, MacL. (not F.), Ann. Jav. 1825, p. 16; Andr. Trans. Ent. Soc. Lond. 1919, p. 144.

*Eccoptogenius mustus*, Bates (not Chaud.), Ann. Soc. Ent. Fr. 1889, p. 267; Andr. Trans. Ent. Soc. Lond. 1921, p. 176.

*Diplochila polita*, Lesne (not F.), Miss. Pavie Hist. Nat. 1904, p. 72.

Bates's description of the type of this species, a single

male specimen taken by Mr. L. Fea at Kawkareet, though short, is exact, except in one particular, the emargination of the labrum and clypeus being much shallower than in *D. polita*, Bates (not F. = *perscissa*, Andr.). I may add that there is a single supraorbital seta. The lobes of the mentum have a rounded tooth at apex, formed by an expansion of the epilobes, and on the margin of the sinus there are two long setæ. Between the apex of the narrow ligula and the paraglossæ there is hardly any indentation, the latter being adnate, but extending considerably beyond the ligula. The right mandible has a simple, the left one a double, tooth at about middle. In this species, *D. polita*, F., and *D. perscissa*, Andr., the form of the buccal organs (excluding labrum) is almost exactly the same. This also applies to the elytral border behind the shoulder, which is distinctly, though minutely, crenulate, interval 9 at this point being reduced to a series of small tubercles.

In Mr. Fleutiaux's collection there are examples from Long Xuyen in Cochin-China (*Dorr*) and from Saigon; another specimen from Cochin-China is in the Brussels Museum; in the Paris Museum are examples from Hanoi in Tonkin (*Dr. Wiet and V. Laboissière*), Laos (*Harmand*), Cochin-China (*Julien and Lemesle*), and Siam (*Pavie, Bocourt, and Larnaudie*); in the British Museum are specimens, some differing from the type in minor points, from Bangkok in Siam (*S. S. Flower*), Malacca (*Castelnau*), Silam in N. Borneo, Lampong in Sumatra (*Buxton*), and Japan. Numerous specimens have lately been taken by Mr. R. Vitalis de Salvaza at various localities in Laos, Tonkin, and Cambodia.

In addition to the above, I have seen examples from Java in the collections of the British, Paris, and Brussels Museums, and have others in my own collection. These are larger than the typical form, and have a distinctly wider prothorax. Similar examples, however, occur in Indo-China, and, as dissection reveals no differences in the buccal organs, I regard them as belonging to this species.

*Diplochila latifrons*, Dej. Spec. Gen. v. 1831, p. 679; Laf. Ann. Soc. Ent. Fr. 1851, p. 279; Bates, Ann. Mus. Civ. Gen. 1892, p. 327; Lesne, Miss. Pavie Hist. Nat. 1904, p. 72.

*Diplochila opaca*, Chaud. Bull. Mosc. 1852, i. p. 67; Bates, Trans. Ent. Soc. Lond. 1873, p. 255; id. Ann. Soc. Ent. Fr. 1889, p. 267.

I have seen in Mr. R. Oberthür's collection the types of both Dejean and Chaudoir, and compared examples of my

own with them. At the time I considered them distinct, but the acquisition of further material both from India and Indo-China leads me to think that we have in reality to do with one species only. I have dissected examples from Tonkin and Calcutta, and find all the buccal organs—rather variable in this genus—to be exactly similar. The mentum has rounded lobes, with two setæ in the emargination; the ligula is narrow, dilated at apex, and separated by a very slight notch from the paraglossæ, which are unusually long and narrow, extending far beyond ligula, and fringed on the inner side with minute setæ; the mandibles are edentate, the left one slightly dilated on inner margin at middle. Bates indicated that in this species the head was much larger in the ♀ than in the ♂—I am not able to confirm this.

Dejean's type was believed to come from the "Indes Orientales." Chaudoir's specimen came from Chusan, Mr. Lesne's from Siam, and Bates records examples from Palou in Burma, Osaka in Japan, and Mytho in Cochin-China. This last specimen is now in Mr. Fleutiaux's collection, along with others from Saigon, Vinh-long, and Long Xuyen (Dorr), all in Cochin-China, and from Cho-Ganh in Tonkin (Duport). Mr. R. Vitalis de Salvaza has lately taken it at Quang-Yen in Tonkin, Muong Pek in Laos, and Pnomh-Penh in Cambodia. In the British Museum there are examples from India and Java; in the Brussels Museum from Lao Kay in Tonkin and Mt. Oengaran in Central Java (A. Koller); in the Paris Museum from Cochin-China (Harmand), Hanoi in Tonkin (Dr. Wiet and V. Laboissière), China (Callery), and Java; and in the Indian Museum from Kashmir (H. T. Pease), Calcutta, Birbhum and Murshidabad in Bengal, and Bangalore in Mysore.

*Diplochila lævis*, Lesne, Bull. Mus. Paris, ii. 1896, p. 243, fig. 6; id. Miss. Pavie Hist. Nat. 1904, p. 72, t. 8. f. 8; Bouch. Ann. Soc. Ent. Fr. 1903, p. 171.

I may add to the description of the author that the lobes of the mentum are bluntly pointed at apex, and that there are two long setæ at the middle of the sinus; the ligula is very narrow, dilated at apex, with a deep notch between it and the paraglossæ; the left mandible has a deep indentation on the inner margin, the right one a blunt tooth.

Described by its author from Siam and Java, this species has since been recorded by Mr. Bouchard from Sumatra and Borneo. In Mr. Fleutiaux's collection there are specimens



from Long Xuyen in Cochin-China (*Dorr*) and Hanoi in Tonkin (*Demange*). In the British Museum are examples from Java, China, Ceylon, Rangoon, and Andaman Is. (*Roepstorff*); in the Indian Museum from Rangoon; in the Brussels Museum from Sumatra; and in the Paris Museum from Siam (*Pavie*, type), and Bangkok (*Larnaudie*), from Tonkin (*J. Levasseur*), and Hanoi (*Dr. Viet*, *V. Laboissière*, and *L. Duport*).

*Diplochila impressa*, F. Suppl. Ent. Syst. 1798, p. 57; Dej. Spec. Gen. ii. 1826, p. 383; Laf. Ann. Soc. Ent. Fr. 1851, p. 279; Redt. Reis. Novar. Zool. ii., Col. 1867, p. 10; Bates, Ann. Mus. Civ. Gen. 1892, p. 326; Andr. Trans. Ent. Soc. Lond. 1919, p. 90; id. Trans. Ent. Soc. Lond. 1921, p. 159.

In this species the mentum is small, lobes rounded at apex, emargination deep, without setæ; ligula small, a little dilated and truncate at apex, separated by a rather wide but shallow notch from the paraglossæ, which extend some way beyond it; mandibles edentate, but the right one has inside a slight protuberance at about middle.

This well-known Indian species has been recorded by Redtenbacher from the Philippine Is. and by Bates from Burma. I have seen specimens in the Oxford Museum from Singapore, and a solitary example in the Paris Museum from Cochin-China (*Beaudouin*).

*Diplochila colossus*, Bates, Ann. Mus. Civ. Gen. 1892, p. 326.

In this species the elytral border behind the shoulder is only very faintly crenulate. The lobes of the mentum are rather pointed at apex, and there are no setæ on the margin of the sinus; the ligula is narrow at apex and separated from the paraglossæ by a very distinct notch; the right mandible has a single, the left a double, tooth.

This is another species described on a unique specimen taken by Mr. L. Fea at Palon in Pegu. Bates thought that this might be an unusually large example of *D. impressa*, but he was quite right in describing it as distinct, the form of the labrum, clypeus, and palpi being very different. Having now seen other examples, this time from Indo-China, I can supplement his excellent description by adding that there are two supraorbital setæ, the form of the palpi is the same in both sexes; although the scutellary striole is wanting, there are on some specimens vestiges of it in the form of one or two minute punctures, and the last ventral segment ♂ has a single seta on each side, the ♀ two setæ. Except in regard

to the palpi, all the characters just mentioned are also found in *D. impressa*.

In Mr. E. Fleutiaux's collection there is an example of this species from Indo-China labelled in Bates's handwriting *Eccoptogenius elongatus*, Bates, var. *laticus*, but I cannot find that this name has been published. Several specimens have been taken by Mr. R. Vitalis de Salvaza in Cambodia at Pnomh-Penh (Brussels Museum), and in Laos at Tavieng, Vien Poukha, and Nam Tham. In the British Museum there are two examples, one from Kedah in Siam (*S. S. Flower*), agreeing with type, the other labelled Java; in this latter specimen both labrum and clypeus are more deeply emarginate than in the typical form, and joint 3 of the antennæ is distinctly longer than 4 and equal to 5, but I notice no other peculiarities. In the Paris Museum there are also two examples, one from Cochin-China (*Beaudouin*), the other from Lakhon, on the borders of Siam and Annam (*Harmand*).

#### Key to the Species.

- |         |   |                           |
|---------|---|---------------------------|
| 1 (2).  | Head on each side with a single supra-orbital pore. Length about 160 mm...  | <i>laevigata</i> , Bates. |
| 2 (1).  | Head on each side with two supraorbital pores.  |                           |
| 3 (8).  | Elytra with scutellary striae as clearly marked as the other striae. Head moderately wide, depressed in front.  |                           |
| 4 (7).  | Striae of elytra clearly incised and moderately deep. Form relatively wide.   |                           |
| 5 (6).  | Surface quite dull. Striae of elytra very clearly punctate. Length about 260 mm.  | <i>pinodes</i> , sp. n.   |
| 6 (5).  | Surface comparatively shiny. Striae of elytra faintly and indistinctly punctate. Length about 150 mm. ....  | <i>latifrons</i> , Dej.   |
| 7 (4).  | Striae of elytra hardly incised, but formed by a series of minute punctures. Form relatively elongate. Length about 240 mm. ....  | <i>lævis</i> , Lesne.     |
| 8 (3).  | Elytra without, or with only vestiges of, a scutellary striae. Head rather narrow, not depressed in front.  |                           |
| 9 (10). | Prothorax strongly narrowed in front. Labial palpi ♂ with apical joint only slightly dilated, nearly three times as long as wide. Labrum deeply emarginate. Left mandible edentate. Length about 240 mm. ....                                 | <i>impressa</i> , F.      |
| 10 (9). | Prothorax moderately narrowed in front. Labial palpi ♂ with apical joint rather strongly dilated, less than twice as long as wide. Labrum only moderately emarginate. Left mandible with a well-marked bifid tooth. Length about 260 mm. .... | <i>colossus</i> , Bates.  |

Genus *HYPOLITHUS*.*Hypolithus vitalisi*, sp. n.

Length 7·5–8·0 mm. ; width 2·9–3·1 mm.

Black, both upper and under sides strongly iridescent ; palpi and joints 1–2 of antennæ testaceous ; trochanters, tibiæ, tarsi, and side-margins of prothorax (faintly) brown ; joints 3–11 of antennæ and femora piceous.

*Head* wide (1·75 mm.), convex, shining, clypeal suture fine, frontal impressions obsolete, surface finely, but not very closely, punctate. *Prothorax* quadrate, but, rather transverse (1·9 × 2·6 mm.), widest a little before middle, finely bordered throughout ; base truncate, apex slightly emarginate, sides evenly rounded, with a single seta rather before the middle, hind angles obtuse and rounded, but quite evident ; median line and transverse impressions very faint, basal foveæ wide and shallow, surface finely punctate, base very closely and confluent, disk nearly smooth. *Elytra* (3·0 × 4·9 mm.) moderately convex, nearly parallel, border sharply angled at shoulder, and slightly sinuate near apex ; striæ deep, very finely crenulate, scutellary striae short, arising in an umbilicate pore, intervals 3–5–7 seriatly punctate, the pores arranged along striæ 2–4–6 respectively, 9 with a series of umbilicate pores, widely interrupted at middle ; surface finely, closely, and distinctly punctate. Body beneath finely punctate, very sparsely along middle line.

About the size of *H. cyanellus*, Bates, but the reflections of the elytra show more blue and less green ; prothorax less transverse, less rounded at sides, the apex more deeply emarginate, the hind angles more rounded ; elytra a little longer and more deeply striate, surface more finely punctate, punctures distinct, not laterally confluent.

LAOS : Vientiane and Paklung (*R. Vitalis de Salvaza*). Many examples. The type is in the British Museum.

*Hypolithus cyanellus*, Bates, Ann. Soc. Ent. Fr. 1889, p. 269.

In describing this species Bates does not mention a locality, but I find from a label on the type that it was taken at Tourane (Annam). Mr. Vitalis de Salvaza has taken only a few specimens, but they come from four different provinces of Indo-China, viz., Annam, Laos, Tonkin, and Cambodia. A variety taken at Natung, near Luang Prabang, differs from the typical form in its almost complete lack of lustre and the rather finer sculpture of the elytra.

*Hypolithus cyaneotinctus*, Bates, Ann. Soc. Ent. Fr. 1889, p. 269; id. Compt. Rend. Soc. Ent. Belg. 1891, p. 331.

Bates gives as localities Tourane, Qui-Nhon (Annam), and Ceylon; to these he later added Konbir and Tetara (Chota Nagpur). The species seems to be distributed throughout India, for I have seen examples from the North-West Provinces, Ranchi in Bengal (*W. H. Irvine*), and Mysore (*T. V. Campbell*). In the Brussels Museum there are some specimens from Barway (*P. Cardon*).

### Key to the Species.

- |  |                               |
|--|-------------------------------|
| 1 (2). Upper surface uniformly and not very finely punctate throughout. Length 10·5 mm. ....   | <i>cyaneotinctus</i> , Bates. |
| 2 (1). Upper surface finely punctate, disk of prothorax nearly smooth. Length 7·5 mm.  |                               |
| 3 (4). Hind angles of prothorax obtuse, but not rounded. Elytra with greenish lustre, finely punctate, the punctures laterally confluent ..... | <i>cyanellus</i> , Bates.     |
| 4 (3). Hind angles of prothorax obtuse and rounded. Elytra with bluish lustre, very finely punctate, the punctures distinct .....              | <i>vitalisi</i> , sp. n.      |

### Genus DIORYCHE.

*Dioryche melanauges*, sp. n.

Length 9·0–9·5 mm.; width 2·9–3·1 mm.

Upper surface very dark bronze, shiny, underside black; joints 1–2 and base of joint 3 of antennæ, palpi, and femora testaceous red, tibiæ and tarsi brown.

*Head* convex (2·0 mm. wide), eyes not prominent, clypeus moderately emarginate, suture rather deep on each side, surface smooth and polished, one or two small punctures near eyes behind. *Prothorax* transverse (2·1 × 2·6 mm.), moderately convex, widest before middle, base slightly emarginate in middle, its sides a little oblique, front margin nearly straight, sides finely bordered, gently rounded in front, then straight to hind angles, contracted slightly more in front than behind, a seta at apical third, hind angles obtuse and a little rounded; median line short, but clear, basal foveæ not very deep and ill-defined; surface nearly smooth, with a few scattered punctures, some vague transverse striæ on disk, base very closely and confluent punctate. *Elytra*

(3·5 × 5·75) moderately convex, border of base bisinuate, forming with side-border at shoulder a very sharp angle, sides slightly widened behind and moderately sinuate at apex; striæ deep, impunctate, scutellary striole elongate, as deep as the striæ, intervals a little convex, 3-5 rather wider than the others, 3-5-7 seriatelý punctate, along striæ 2-5-7 respectively, the punctures small but clearly marked, rather larger on 3, about 15 on each interval, 9 with a similar series along stria 8, widely interrupted in middle, an uninterrupted row of small punctures along marginal channel; surface moderately shiny, finely, irregularly, but quite clearly punctate throughout. Under surface smooth.

Larger and a little longer than *D. amena*, Dej., legs and antennæ darker, head and prothorax with hardly any trace of metallic green. The prothorax with more rounded hind angles, the base more densely and confluentlý punctate; the elytra with deeper striæ, a longer scutellary striole, seriate punctures larger, general puncturation much more evident.

TONKIN: Kwang Choo Wan (*R. Vitalis de Salvaza*). The type is in the British Museum.

*Dioryche sericea*, sp. n.

Length 7·5-8·5 mm.; width 2·50-2·75 mm.

Upper surface dark bronze, with a sericeous lustre, especially on elytra, underside black; joints 1-2 of antennæ, base and apex of palpi, and sometimes tibiæ dark red.

*Head* convex (1·8 mm. wide), eyes not prominent, clypeus only slightly emarginate in front, the suture very fine, surface smooth and polished, with only vestiges of minute puncturation at sides. *Prothorax* transverse (1·6 × 2·3 mm.), moderately convex, widest just before middle, base truncate, with sides a little oblique, apex slightly emarginate, sides finely bordered and evenly rounded, but contracted a little more in front than behind, a seta at apical third, hind angles obtuse, but very little rounded; median line faint, basal foveæ deep, surface smooth with some minute scattered punctures, a little more evident along front, base densely punctate, the punctures of varying sizes. *Elytra* (2·9 × 4·5 mm.) convex, elongate, sides finely bordered, nearly parallel, distinctly sinuate near apex; striæ comparatively deep, scutellary striole reduced to a vestige, adjoining stria 2, intervals rather convex, 2 narrower than the others, 5 depressed on outer side near apex, 3-5-7 seriatelý punctate, the punctures mostly adjoining striæ 2-5-7 respectively (but

more irregular on 5), of moderate size, but very clearly defined, 12 or 15 in number, a similar series on interval 9, adjoining stria 8, widely interrupted in middle, and an uninterrupted row of smaller punctures along marginal channel; surface nearly smooth, very silky in appearance, with two irregular rows of almost imperceptible punctures along each interval.

Very different from any other species known to me. Longer and narrower than *D. amœna*, Dej., with dark legs and antennæ; head and prothorax without trace of metallic green. Head with clypeus less emarginate; prothorax with sides more evenly rounded, the disk smoother; elytra longer, narrower, more parallel, the seriate punctures much larger.

TONKIN: Tranninh. ANNAM: Hué, Muong Sen, and Keng Trap (*R. Vitalis de Salvaza*). The type is in the British Museum.

A solitary example in the British Museum labelled "Halupahani, Haldummulle, Ceylon," differs only from the typical form in having the tibiæ light red instead of very dark red.

*Dioryche clara*, sp. n.

Length 7·5–8·5 mm.; width 2·75–3·25 mm.

Upper surface of a brilliant brassy hue, beneath black with faint æneous reflections; buccal organs and legs piceous, joint 1 of antennæ and apex of palpi red.

*Head* convex, wide (1·75 mm.), with fairly prominent eyes, clypeus moderately emarginate in front, the suture very clearly marked, surface nearly smooth, some scattered punctures at sides and on clypeus. *Prothorax* transverse (1·8 × 2·6 mm.), moderately convex, widest a little before middle, contracted more in front than behind, base gently bisinuate, bordered at sides, apex slightly emarginate, sides finely bordered, rounded in front, then straight to the base, a pore and seta at apical third, hind angles slightly obtuse, but very little rounded; median line fine and very short, on middle of disk, basal foveæ small and rounded; apex moderately, base closely and rather finely punctate, disk and sides with a few small punctures. *Elytra* (3·1 × 4·5 mm.) convex, rounded at sides, widest a little behind middle, the fine border rather strongly sinuate near apex; striæ fine, but clearly cut, impunctate, scutellary stria very short, joining 2 at base, intervals 3–5–7 rather wider than the others, especially towards apex, and seriatly punctate, chiefly, but not wholly, along striæ 2–4–6 respectively, the punctures

large, 12 or 15 on each, and occupying half the interval, a similar series, widely interrupted in middle, on stria 8, and a smaller uninterrupted series along the marginal channel; surface finely shagreened, with two irregular rows of minute but clearly visible punctures along each interval. Under-side smooth, with a few scattered punctures; prosternal process minutely setose at apex.

Allied to *D. indochinensis*, Bates, but much brighter in colour, the legs dark. Head similar; prothorax less contracted behind, the hind angles less rounded, basal foveæ smaller, puncturation not so fine; elytra with the seriate pores, especially on intervals 5 and 7, larger, general puncturation much clearer.

TONKIN: Hoabinh and Kwang Choo Wan, many ex. (*R. Vitalis de Salvaza*), Hong Kong and Pescadores Is. (British Museum), Hong Kong (Oxford Museum). The type (Hoabinh) is in the British Museum.

*Dioryche amæna*, Dej. Spec. Gen. iv. 1829, p. 73.

*Dioryche latula*, Bates, Ann. Soc. Ent. Fr. 1889, p. 270; Andr. Trans. Ent. Soc. Lond. 1921, p. 177.

The best-known and most widely spread species of the genus. It has been taken throughout Indo-China (Tonkin, Annam, Laos, and Cambodia) by Mr. Vitalis de Salvaza, Elsewhere it occurs in Formosa, in the large Malay islands, in Burma, and throughout North India. I have seen no Central or Southern Indian examples, except from the Nilgiri Hills (*H. L. Andrewes*). There is in the British Museum an example taken at Anuradhapura in Ceylon (*Dr. W. Horn*).

*Dioryche indochinensis*, Bates, Ann. Soc. Ent. Fr. 1889, p. 270; Andr. Trans. Ent. Soc. Lond. 1921, p. 177.

This species is recorded from various parts of Cochinchina and Cambodia, and, thanks to Mr. E. Fleutiaux, I have been able to examine the type; Mr. Vitalis de Salvaza has taken it at Vientiane in Laos. Bates mentions it as having been captured by Mr. L. Fea at Rangoon, and the late Mr. G. Q. Corbett also found it in Burma at Shwegyin and Tharrawaddy. There are specimens in the British Museum from "Mountains, Tenasserim, Siam border" and from South Siam (*H. Way*).

*Key to the Species.*

- 1 (6). Elytra with at least intervals 1-4 narrow and convex near apex, the seriate punctures moderate or small, form rather elongate.
- 2 (3). Scutellary striae deep and elongate, surface of elytra very clearly punctate . . . . . *melananges*, sp. n.
- 3 (2). Scutellary striae short or obsolescent, elytra very finely and inconspicuously punctate.
- 4 (5). Scutellary striae obsolescent, seriate punctures of moderate size, elytra highly sericeous, legs and antennæ dark . . . . . *sericea*, sp. n.
- 5 (4). Scutellary striae short but clearly marked, seriate punctures very small, elytra dull but hardly sericeous, legs and antennæ testaceous . . . . . *amana*, Dej.
- 6 (1). Elytra with intervals flat to apex, the seriate punctures very large, form short and broad.
- 7 (8). Elytra very clearly punctate, of a bright brassy colour, legs dark . . . . . *clara*, sp. n.
- 8 (7). Elytra finely and inconspicuously punctate, of dull cupreous colour, legs testaceous . . . . . *indochinensis*, [Bates.]

## Genus MISCELUS.

*Miscelus carinatus*, sp. n.

Length 11-14 mm.; width 3-4 mm.

Black, shiny; antennæ, buccal organs, tarsi, and ventral surface occasionally piceous.

*Head* (2.3 mm. wide) convex, flat in front, neck lightly constricted at some distance from eyes, which (for the genus) are moderately prominent; genæ gradually contracted behind; clypeus deeply emarginate; frontal foveæ shallow, faintly strigose; a small impression on middle of front, surface smooth. *Prothorax* convex, cordate, as long as wide (3.0 mm.), base bisinuate, bordered, apex widely emarginate, front angles not much rounded, sides with narrow reflexed border, gently rounded in front, sinuate near hind angles, which are reflexed and sharply rectangular; median line deep, almost foveate behind, but, as a rule, stopping short of the basal margin; hind transverse impression deep; basal foveæ rather slight, elongate, near the angles; surface practically smooth, with some almost imperceptible transverse striation and some very sparse minute punctures. *Elytra* (4.0 × 8.0 mm.) convex at sides only, nearly parallel, shoulders well marked, sides with a fine reflexed border, slightly sinuate at basal third; striæ fine, impunctate, faintly crenulate at sides, odd



intervals rather narrower than even ones, 1 slightly raised, 3-5-7 carinate, more strongly so near base and 5-7 more strongly than 3, 3 with a single setiferous pore close to apex, surface with a faint line of minute punctures along middle of intervals. Beneath the head bears some long setæ, the prosternal process is cuneiform, pointed at apex, the surface generally finely and rather sparsely punctate, very shortly pubescent.

The shining surface and carinate elytra at once distinguish this species from *M. javanus*, Klug. In the new species the eyes are more prominent, the prothorax narrower and with distinctly bordered base, the elytra longer, with intervals of different widths, and no apical red spot.

LAOS: Pou Bia, Ban Sai, Xieng Khouang, Pia Hat, Muong Pek, and Pou Mi (*R. Vitalis de Salvaza*). ASSAM: Garo Hills, Tura, 3500-3900 ft. (*S. W. Kemp*, Ind. Mus.). The type is in the British Museum.

I may mention here one or two generic characters which seem hitherto to have escaped attention. In the ♂ there is on the underside of the front femora near the base a rounded tubercle, bearing a dense brush of brownish hairs. The sides of the mesosternum are cariniform; the carinæ are simple in *luctuosus*, generally a little serrate in *M. javanus*, but in the species now described the serration is marked and ends behind in a well-defined tooth. On the margin of the apical ventral segment there is in the ♂ a single pair of setæ, rather widely distant; in the ♀ there is in addition a second pair, nearer the middle and at some little distance from the margin.

*Miscelus javanus*, Klug, Jahrb. Ins. 1834, p. 82, t. 1. f. 9; Andr. Trans. Ent. Soc. Lond. 1919, p. 183.

Bates (Ann. Soc. Ent. Fr. 1889, p. 283) records *M. ceylonicus*, Chaud., from Mytho in Cochin-China: I have examined this specimen, now in Mr. Flentiaux's collection; it has the customary red apical spot of Javanese examples, and does not seem to me to differ from *M. javanus*. Mr. Vitalis de Salvaza has taken a considerable number of specimens in different parts of Laos, which appear to belong to this species, though on average they are distinctly darker than examples from India and Java. The apical red spot is sometimes present, sometimes absent; when present it is frequently very faint.

This species and *M. carinatus* described above are the only representatives of the genus known at present in Indo-China.

Mr. Severin has very kindly sent me from the Brussels Museum for examination four of Putzeys' types of *Miscelus*, viz., *M. unicolor* (Java), *M. vulneratus* (Moluccas), *M. paradoxus* (Philippine Is.), and *M. convexicollis* (Borneo). The first of these was described before the others (Mem. Soc. Liège, ii. 1845, p. 375), and on a single specimen. The other three were described together (Ann. Mus. Civ. Gen. 1875, pp. 724-5), and the author evidently had but little material at his disposal, though the specimens came from very different localities. In these circumstances he seems to me to have treated individual peculiarities as of specific value. To my eyes *M. vulneratus*, *paradoxus*, and *convexicollis* do not differ in any material way from *javanus*, and I consider them mere synonyms. *M. unicolor* I look upon as an unspotted variety of the same species, identical with the subsequently described *M. rufiventris*, Walk. (Ann. & Mag. Nat. Hist. (3) ii. 1858, p. 202), and *M. ceylonicus*, Chaud. (Berl. ent. Zeit. 1861, p. 125).

The types of Putzeys' two remaining species, *M. luctuosus* and *M. stygius* (Ann. Mus. Civ. Gen. 1875, pp. 725-6), both coming from New Guinea, are in the Genoa Museum, and, thanks to the courtesy of Dr. Gestro, I have been able to examine them. Of the former, Putzeys gives a fairly long and detailed description, and I find it to be quite distinct, but I am not able at present to differentiate *M. stygius* from *M. unicolor*.

Schaufuss has also described two species, the types of which I have not seen, viz., *M. celebensis* and *M. planatus* (Hor. Soc. Ent. Ross. xix. 1885, pp. 183-4); the latter is stated by the author to be only a variety of *javanus*, and I can see nothing in the description of the former to lead me to think that it is really distinct from that species.

The following table shows how the three species of this genus, which I have been able to recognise, may be distinguished; I have not referred to the apical red spot, which occurs only in *javanus*, and may be present or absent:—

### Key to the Species.

- 1 (2). Eyes moderately prominent; prothorax with front angles rounded, projecting very little forwards, hind angles much rounded, base distinctly bordered; elytra with very square shoulders, apex of each elytron emarginate, the outer angle rounded, but forming a distinct blunt tooth, intervals not carinate, but outer ones convex near base. . . . . *luctuosus*, Putz.

- 2 (1). Prothorax with front angles slightly rounded but porrect, hind angles rectangular and fairly sharp; elytra with moderately rounded shoulders, apex scarcely emarginate, outer angle of truncature rounded.
- 3 (4). Eyes moderately prominent, prothorax with hind angles projecting outwards, base distinctly bordered; elytra with intervals 3-5-7 strongly carinate (at least on basal half), surface very shiny. *curvatus*, sp. n.
- 4 (3). Eyes flat; prothorax with hind angles rectangular, but not projecting outwards, base indistinctly bordered; elytra with intervals 3-5-7 generally convex (at least on basal half), surface dull to moderately shiny. *javanus*, Klug.

XXXVII.—*The Forms of Jaculus jaculus in Egypt and Syria.* By OLDFIELD THOMAS.

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WHEN working out Capt. Angus Buchanan's Air mammals Mr. Hinton and I found it advisable to divide the western forms of *Jaculus jaculus*, by colour, into several different races, and I have now had an opportunity to examine the eastern ones in the same way.

In the first place, it should be noted that the large form described by me as *Jaculus j. gordonii* from Kordofan, and hitherto assumed to range northwards to Khartoum, does not really do so, as all the numerous Khartoum specimens now available agree strictly in size with those from Lower Egypt. In comparison with the series of skull-lengths given by me for Jerboas of this group in 1913\*, those of half-a-dozen Khartoum specimens are instructive—32·5, 32·7, 33·2, 33·4, 33·6, 33·7 mm.,—and show a practical identity with those of Lower Egypt, thus indicating that they should not be referred to *gordonii*, but to *jaculus*.

Their colour, however, is of so uniformly darker, browner, and richer a tone than the buffy Lower Egypt animals that they should apparently be recognized as subspecifically distinct.

\* Ann. & Mag. Nat. Hist. (8) xi. p. 484 (1913).

*Jaculus jaculus*<sup>4</sup> *butleri*, subsp. n.

Size and essential characters as in *J. j. jaculus*, but the colour above nearly "avellaneous," as compared with "pinkish buffy" in that animal. Proximal whitish band on tail, that just before the subterminal black ring, practically never running through the black ring below to join the white terminal pencil, as it so very frequently does in *jaculus*.

Dimensions of the type (from dry skin):—

Head and body 115 mm.; tail 196; hind foot 61.

Skull: incisor-bulla length 33·2; condylo-incisive length 28·7; width between outer corners of anteorbital foramina 16·2; bimeatal width 23·3; length of bulla 12·8; upper molar series 5.

*Hab.* Khartoum and neighbouring localities. Type from Khartoum.

*Type.* Adult female. B.M. no. 11. 11. 25. 80. Original number 192. Collected in the winter of 1908, and presented by A. L. Butler, Esq., to whom we owe nearly all of our fine series of twenty-five specimens.

It is interesting to notice how very sharp the dividing-line between *jaculus* and *butleri* is. Specimens from Dongola (Kerma and Merowe) are absolutely *jaculus*, while some from Shendi are distinctly *butleri*, of which we also have a specimen from Sennaar. Then, but little further south, there occurs *gordoni*, with an incisor-bulla length of upwards of 35 mm.

At the northern end of the *J. jaculus* area another form deserves a technical name:—

*Jaculus jaculus syrius*, subsp. n.

Size as in true Egyptian *jaculus*, not larger and with longer limbs as in the geographically intermediate form from Jaffa described as *schlüteri*. General colour above pale drab, the fine blackish tips to the hairs unusually distinct, and, on the sides, showing particularly strongly on the otherwise white hairs, these lateral hairs in *jaculus* being, like those of the back, more or less buffy. Tail light-coloured, its sub-terminal dark brown ring completely separating the white terminal tuft from the rest of the tail.

Size of skull and inflation of the bullæ about at the maximum found in *jaculus*.

Dimensions of the type (measured in the flesh):—

Head and body 95 mm.; tail 170; hind foot 58; ear 23.

Skull: incisor-bulla length 34.1; condylo-incisive length 30; width between outer corners of anteorbital foramina 16.2; bimeatal width 23.8; length of bulla 14.3; upper molar series 5.

*Hab.* Syrian desert. Type from Karyatein, about 34° N., 38° E. Other specimens from the Syrian desert east of the Dead Sea.

*Type.* Old female. B.M. no. 5. 7. 2. 14. Original number 84. Collected 27th March, 1905, by Douglas Carruthers. Five specimens examined.

When writing recently\* about the Muscat jerboa, I erroneously referred to the Karyatein form as *J. laftusi*, but that species is decidedly smaller, the incisor-bulla length being 31.7 mm. in a Baghdad example and 31.5 mm. in the type.

The drabby instead of buffy colour of this jerboa would seem to distinguish it sufficiently from the Egyptian *jaculus*.

### XXXVIII.—New or little-known Tipulidæ (Diptera).—

IX. *Australasian Species.* By CHARLES P. ALEXANDER, Ph.D., F.E.S., Urbana, Illinois, U.S.A.

THE present instalment considers only species from New Zealand, supplementary to Mr. Edwards's monographic review and to papers by the writer now in press. The material described herein was received almost entirely from Dr. Campbell, Mr. Harris, and Mr. Watt, one species being from Dr. Tillyard and Mr. Philpott. I am deeply indebted to all of the above gentlemen for their kind interest in making known the remarkable crane-fly fauna of New Zealand. Except where stated to the contrary, the types are preserved in the writer's collection.

#### *Molophilus macrocerus*, sp. n.

General coloration pale brown; male antennæ longer than the body; halteres elongate; wings whitish subhyaline, veins pale; petiole of cell  $R_4$  very long; basal pleural appendage of the male hypopygium bifid, one arm bearing a brush of tawny hairs before the tip.

\* Ann. & Mag. Nat. Hist. (9) viii. p. 440 (1921).

*Male*.—Length 3.3–3.6 mm.; wing 4.5–5 mm.

Rostrum and palpi pale brown. Antennæ of the male about one-fourth longer than the body, pale brown; flagellar segments elongate-fusiform, with abundant, delicate, erect setæ. Head dark.

Pronotum pale testaceous, the scutellum obscure yellow. Mesonotum uniformly brown, the surface shiny with few conspicuous setæ. Pleura pale yellowish testaceous. Halteres very long and slender, pale brown. Legs with coxæ brownish testaceous; remainder of the legs pale brownish testaceous, the terminal tarsal segments a little darker. Wings whitish subhyaline, the macrotrichia long but very delicate, pale brown; veins almost white; the fringe of macrotrichia along the posterior and anal margins very elongate. Venation: *Sc* short, ending just before the fork of *Rs*; petiole of cell *R*<sub>4</sub> very long, from one-third to nearly one-half *Rs*; *r* short, on *R*<sub>2+3</sub> a short distance beyond the fork of *Rs*; basal deflection of *Cu*<sub>1</sub> on *M*<sub>3+4</sub> from one-third to two-thirds its length beyond the fork.

Abdomen brown. Male hypopygium with the basal pleural appendage appearing as a slender chitinated arm, deeply split near mid-length, the two arms but feebly divergent, one arm, immediately before the tip, bearing a dense brush of tawny hairs; apical spine blackened; apical appendage small, black, slightly curved, the apex feebly notched. Penis-guard very long and slender, straight.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, September 14, 1921 (*T. R. Harris*).

*Paratopotype*, 1 ♂, with the type; 1 ♂, October 15, 1921.

*Molophilus tanypus*, sp. n.

General coloration pale brown; antennæ short; legs very long and slender; wings whitish subhyaline, variegated with patches of dark macrotrichia; basal deflection of *Cu*<sub>1</sub> beyond the fork of *M*; abdomen pale brown, with dark brown lateral spots; male hypopygium with the mesal face of pleurite at apex bearing dense brushes of dark hairs.

*Male*.—Length 3–3.3 mm.; wing 5–5.5 mm.

Rostrum and palpi pale brownish testaceous. Antennæ short, pale brown, the scapal segments a little paler; flagellar segments cylindrical. Head dark, sparsely pruinose.

Mesonotal præscutum pale brownish testaceous, fading into yellowish laterally; posterior sclerites darker brown. Pleura yellowish testaceous, the dorsal sclerites infuscated.

Halteres elongate, testaceous, the knobs large, almost white. Legs very long and slender for an Eriopterine crane-fly, especially the posterior legs which measure approximately 12.5 mm. in total length; coxæ and trochanters obscure yellow; remainder of the legs dark brown. Wings whitish subhyaline, variegated with conspicuous patches of dark macrotrichiae, giving to the wings a somewhat nebulous appearance; the more conspicuous of these blotches occupy the stigmal area, extending to the fork of *Rs*; interrupted areas at *r-m*, fork of *M*, and along vein *M*<sub>3</sub> near the base of the distal section; veins pale with dark macrotrichiae. Venation: basal deflection of *Cu*<sub>1</sub> on *M*<sub>3</sub> immediately beyond the fork of *M*.

Abdomen pale brown, with a series of five dark brown lateral spots. Male hypopygium with the mesal face of the pleurites at apex provided with a dense brush of long dark hairs. Two pleural appendages, both basal in position: one chitinized, elongate, terminating in a clavate lobe, at the base of the lobe with a conspicuous shoulder that is microscopically denticulate; second appendage large, produced caudad into a flattened blackish lobe, the mesal portion very extensive, extending as a thin sheet almost to the penis-guard. Penis-guard very long, straight, tapering very gradually to the apex, subtended on either side at the base by the small inconspicuous apophyse.

*Hab.* New Zealand (Both Islands).

*Holotype*, ♂, Ohakune, altitude 2060 feet, September 23, 1921 (*T. R. Harris*).

*Paratype*, ♂, Greymouth, sea-level, September 7, 1921 (*T. R. Harris*).

*Molophilus quadrifidus*, sp. n.

General coloration brown; legs unbanded; wings grey; male hypopygium with the basal pleural appendage large, complicated, black, terminating in four arms.

*Male*.—Length 5 mm.; wing 6 mm.

Rostrum and palpi brown. Antennæ elongate, about three-fourths the length of the body; scapal segments obscure yellow, the flagellum dark brown; flagellar segments enlarged basally, attenuate apically. Head dark brown.

Mesonotal præscutum brown, with three dark brown stripes; remainder of mesonotum and the pleura dark brown. Halteres pale. Legs with the coxæ and trochanters pale; femora and tibiæ pale brown, the tarsi passing into dark brown. Wings grey, the veins brown. Venation: the

apparent  $r$  (which is probably the basal deflection of  $R_2$  as in the Pediciine crane-flies) opposite the basal deflection of  $R_3$ ; basal deflection of  $Cu_1$  about one-third its length beyond the fork of  $M$ .

Abdomen brown. Male hypopygium with the basal pleural appendage large and complicated in structure, black, produced into four arms; a blunt basal arm on the mesal face, its angle densely filled with erect yellow setæ; a powerful apical arm that is suddenly narrowed to the acute tip, the outer edge of which is microscopically denticulate; between the two arms described arises a third arm which is deeply split into two slender points, one a little stouter than the other. Apical hook of the pleurite short, strongly curved.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, in alcohol, Governor's Bay, Banks Peninsula, Canterbury, September 9, 1921 (*J. W. Campbell*).

*Paratopotypes*, 2 broken ♂ ♂, alcoholic; *paratypes*, 2 ♂ ♂, Mt. Grey, Canterbury, November 27, 1921 (*Campbell & Lyndsay*); 1 ♂, Dunedin, November 26, 1921 (*G. Howes*).

*Molophilus tillyardi*, sp. n.

General coloration reddish brown; head grey; antennæ short; legs unbanded; wings tinged with brown; abdomen dark brown; basal pleural appendage slender, bifid at apex.

*Male*.—Length 4.2 mm.; wing 5.5–5.8 mm.

*Female*.—Length 5.8 mm.; wing 5–5.3 mm.

Rostrum obscure brownish yellow; palpi dark brown. Antennæ short; scapal segments obscure brownish yellow; flagellar segments dark brown, densely clothed with white hairs. Head light grey.

Mesonotal præscutum reddish yellow, the median area darker brown; remainder of mesonotum reddish brown. Pleura dark brown. Halteres brownish yellow, the knobs dark brown. Legs with coxæ and trochanters obscure yellow; femora brownish yellow; tibiæ and tarsi brown. Wings with a faint brown tinge, the macrotrichiæ dark brown; veins darker brown. Venation: basal deflection of  $Cu_1$  at or close to the fork of  $M$ .

Abdomen dark brown, including the hypopygium. Male hypopygium with the basal pleural appendage slender, terminating in an acicular black rod with a microscopic spur before tip on the lateral face; apical appendage a powerful curved hook, the apex bifid, with a large black spine. Apex of pleurite slender, terminating in a slender black tubercle;



another tubercle on lateral face before apex; a third on mesal face, more basad in position; immediately basad of this a small blackened lobe with the margin microscopically denticulate.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Nelson, December 7, 1920 (*R. J. Tillyard*).

*Allotype*, ♀, Dun Mt., January 24, 1921 (*A. Philpott*).

*Paratypes*, 1 ♂, 1 ♀, Dun Mt., altitude 2000 feet, December 14, 1920; 1 ♂, 1 sex?, December 2, 1920; 1 ♀, Dun Mt., altitude 2000 feet, January 24, 1921 (*A. Philpott*); Dunedin, 1 ♂, 2 ♀♀, November 26, 1921 (*G. Howes*).

Type in the collection of the Cawthron Institute.

*Molophilus plagiatu*s, sp. n.

General coloration yellow; antennæ short, pale in colour; mesonotal præscutum uniform in colour; dorsal pleurites dark brown, bordered ventrally by a silvery line; fore femora black; wings pale yellow, with a large area of black macrotrichia along the cord; less distinct seams along veins *Cu* and *Cu*<sub>2</sub>; basal pleural appendage of male hypopygium a straight rod bearing at and before the tip on the outer face two long acute spines that are perpendicular to the appendage.

*Male*.—Length 3.5 mm.; wing 4.6 mm.

*Female*.—Length about 4 mm.; wing 5 mm.

Rostrum and palpi dark brown. Antennæ short, pale brownish testaceous. Head yellow, infuscated posteriorly.

Mesonotal præscutum, scutum, and scutellum uniformly pale brownish yellow, the postnotum dark brown. Pleura with all the dorsal sclerites dark brown, the ventral margin sharply delimited, extending from the fore coxæ to the base of the abdomen, passing beneath the root of the halteres; ventral sclerites of pleura and the sternum pale with a microscopic silvery pubescence adjoining the dark margin, on the sternites passing into yellow. Halteres densely covered with brown and golden setæ. Legs with the coxæ and trochanters obscure yellow; fore femora covered with long black setæ, only the extreme bases narrowly paler; other femora yellow; tibiae yellow, on the fore tibiae the tips and an indistinct subbasal ring blackish; other tibiae uniformly yellow, the tips weakly infuscated; metatarsi obscure yellow, the tips blackened; remainder of tarsi black. Wings pale yellow, with principally yellow macrotrichia; a large area of black macrotrichia along the cord; veins *Cu* and *Cu*<sub>2</sub> faintly seamed with black macrotrichia; less distinct areas on

veins  $R_{2+3}$ ,  $R_5$ , and  $M_3$  before the tips and on vein 2nd  $\Delta$  near the base. Venation: basal deflection of  $Cu_1$  in alignment with the basal deflection of  $M_3$ .

Abdomen dark brown, including the hypopygium; lateral line narrowly darker brown; sternites paler, except laterally. Male hypopygium with the pleurites terminating in small, black, apical hooks; basal pleural appendage a straight black rod, the outer face at and before the tip with two perpendicular acute spines, with smaller denticles filling the space between; distal pleural appendage single, a straight rod that is rather deeply bifid at apex, the outer arm stouter than the slender, weakly arcuate inner or mesal arm.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 15, 1921 (*T. R. Harris*).

*Allotopotype*, ♀, October 7, 1921.

*Paratopotypes*, 5 ♂ ♂, October 7, 1921; 1 ♂, October 14, 1921; 3 ♂ ♂, October 17, 1921; 3 ♂ ♂, October 19, 1921; 5 ♂ ♂, 1 ♀, October 27, 1921.

*Molophilus plagiatu*s is related to *M. cruciferu*s, Alexander, and *M. pulcherrimu*s, Edwards, but is a very distinct species.

*Molophilus sublateralis*, sp. n.

*Male*.—Length about 3 mm.; wing 3.3 mm.

*Female*.—Length about 4.5 mm.; wing 4.4 mm.

Generally similar to *M. plagiatu*s, sp. n., differing as follows:—

Antennal scape dark brown, the flagellum very pale testaceous yellow. Head dark brown. Mesonotal præscutum obscure yellow medially, the anterior margin broadly dark brown, this area sending caudad two conspicuous, sublateral, brown stripes that cross the suture and suffuse the centres of the scutal lobes, the extreme anterior lateral margin of the præscutum likewise darkened, the space between this and the sublateral brown stripe obscure testaceous yellow; postnotum pale, a little infuscated near the root of the halteres. Pleura with the dark brown stripe narrower, the dorsal portion being much paler than the deep brown ventral portion, this latter passing immediately beneath the root of the halteres; ventral pleurites and the sternites silvery white. Fore femora covered with dense black setæ as in *plagiatu*s; fore tibiæ and tarsi likewise dark-coloured. Wings grey, the costal margin broadly and conspicuously light yellow; small dark patches of macrotrichia much more abundant and more clearly defined than in *plagiatu*s, these

dark areas as follows:—At origin of *Rs*; at stigma, continued caudad along cord; conspicuous seams on veins *Cu*, 1st *A*, and 2nd *A*, except at the tips, which are broadly white; other areas along *M* near the fork; on  $R_{2+3}$  before the tip; on  $R_4$  beyond mid-length; scattered along most of the length of  $R_5$ ; on  $M_{1+2}$  near mid-length; on  $M_3$  near two-thirds the length, and on the distal section of  $Cu_1$  near mid-length; tips of all the longitudinal veins pale except  $R_5$ , where the dark setæ continue to the margin. Male hypopygium with the basal pleural appendage on outer face before tip bearing three powerful spines, the more apical one smallest, the more basal spine largest, these spines nearly perpendicular to the appendage; apical pleural appendage sinuous, rather deeply bifid at tip, the arms divergent, the lateral arm longer but of about the same diameter as the mesal or inner arm.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 7, 1921 (*T. R. Harris*).

*Allotopotype*, ♀, October 15, 1921.

*Amphineurus molophilinus*, sp. n.

General coloration dark, the entire body very densely covered with long, whitish, somewhat flattened setæ; male antennæ about one-half the length of the body; wings rufous brown, spotted with darker brown; cell  $R_2$  sessile as in *Molophilus*; cell 1st  $M_2$  closed.

*Male*.—Length 6 mm.; wing 7.4 mm.

Rostrum and palpi black. Antennæ moderately elongate, approximately one-half as long as the body; scape obscure yellowish brown; flagellum black, the segments with an abundant erect pubescence. Head dark grey, provided with abundant whitish setæ.

Mesonotal præscutum light brown, with three darker brown stripes; entire surface except the broad median stripe almost concealed by abundant white appressed setæ; remainder of mesonotum blackish, sparsely pruinose. Pleura dark, the colour practically concealed by abundant, white, appressed setæ; remainder of mesonotum blackish, sparsely pruinose. Pleura dark, the colour practically concealed by a great abundance of long white setæ on all the sclerites. Halteres pale. Legs with the trochanters concolorous with the pleura; remainder of the legs brownish black, the femoral bases narrowly and indistinctly paler. Wings with a strong rufous-brown tinge, spotted along the veins with dark brown, including areas at the origin of *Rs*,

along the cord and outer end of cell 1st  $M_2$ , and along the wing-margin at the ends of all the veins; veins brown, darker in the infuscated areas; the colour is produced by very abundant macrotrichiae that cover the entire wing. Venation:  $Rs$  ending in cell  $R_2$  as in *Molophilus*;  $r$  on  $R_2$  about its own length beyond the fork of  $Rs$ ; cell 1st  $M_2$  closed; basal deflection of  $Cu_1$  one-third its length or less before the fork of  $M$ .

Abdominal tergites dark, the colour almost concealed by dense white setae; sternites similar, but the apical margins of the segments appear broadly whitish, due to the greater abundance of setae. Male hypopygium with a median dorsal (the apparent ventral) style; on either side of this a deeply bifid, slender appendage, the lateral arm shorter, sinuous, the apex acutely pointed; mesal arm longer, decussate across the mid-line, dilated near the ends, the extreme tips of each produced into an acute black spine.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dunedin (Opoho), Otago, October 24, 1921 (*M. N. Watt*).

*Paratopotypes*, 1 ♂, November 8, 1921; 1 ♂, November 20, 1921 (*M. N. Watt*); 3 ♂♂, Flagstaff Hill, Dunedin, open country, December 9-10, 1921 (*G. Howes*).

"In scrub."

*Amphineurus molophilinus* is a very distinct fly that suggests in several respects a species of *Molophilus*, but has the wing-membrane densely covered with macrotrichiae and is to be placed in *Amphineurus*.

*Amphineurus harrisi*, sp. n.

Antennae of male elongate; wings subhyaline; cell  $R_2$  petiolate; cell 1st  $M_2$  open; cell  $M_3$  sessile or nearly so; male hypopygium with the ninth tergite terminating in two parallel spines; basal pleural appendage branched beyond mid-length; penis-guard terminating in a long slender spine.

*Male*.—Length about 4.5 mm.; wing 6.5 mm.

Rostrum light brown; palpi dark brown. Antennae elongate, a little shorter than the body; flagellum appearing subnodose as in the *insulsus* group of species; flagellum segments elongate-fusiform, except at the distal end with abundant erect setae; scapal segments brownish testaceous; basal flagellar segments indistinctly bicolorous, dark brown, the apex narrowly pale; terminal flagellar segments uniformly brownish black. Head grey.

Mesonotum rather uniform light brown, the præscutum pale laterally, but without distinct markings. Pleura whitish testaceous; setæ on body delicate, black, not abundant. Halteres pale brown. Legs with the coxæ and trochanters concolorous with pleura; remainder of the legs uniformly brown, the tarsal segments darker. Wings subhyaline; a faint brown cloud at  $r$ ; membrane and veins with rather numerous macrotrichia, congregated into a more dense patch at the fork of  $M$ ; veins brown. Venation: cell  $R_2$  petiolate;  $r$  on  $R_2$  about two and one-half times its length beyond the fork; cell 1st  $M_2$  open by the atrophy of  $m$ ; cell  $M_1$  very short-petiolate to sessile, the petiole much shorter than  $r-m$ .

Abdomen uniform light brown. Male hypopygium with the ninth tergite small, chitinized, with a V-shaped notch, the lobes acute, parallel, directed caudad; basal pleural appendage slender, the tip gently curved, a small blunt lobe just beyond mid-length; distal appendage mitten-shaped, deeply cleft at apex, the lateral spine (thumb) acute. Penis-guard dilated at base, the dorsal margin weakly spinous, the apex produced dorsad into a very long slender spine, the acute tip blackened. Apex of pleurite terminating in a small, spinulose, blackened knob.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 10, 1921 (*T. R. Harris*).

*Amphineurus harrisi* is named in honour of the collector, Mr. T. R. Harris, to whom I am very greatly indebted for many crane-flies from New Zealand. It belongs to the group of *A. insulsus* (Hutton), as does *A. horni*, Edwards, and the two species next described. *A. horni* has a wide range in New Zealand, from Ohakune in the North Island to Dunedin in the southern part of the South Island.

*Amphineurus recurvans*, sp. n.

*Male*.—Length about 4.2 mm.; wing 6.3–6.5 mm.

Generally similar to *A. harrisi*, differing as follows:—

Size of body slightly smaller. Pronotal scutellum light yellow. Wings with cell  $M_3$  petiolate, the petiole a little more than one-half the basal deflection of  $Cu_1$ . The holotype has the wing narrower and more greyish than the Otira paratype. In the latter specimen, the wings are tinged with pale brown. Male hypopygium with the ninth tergite appearing as two flattened black lobes, lying parallel, their tips broadly rounded, the lobes separated from one another

only by a deep and narrow U-shaped notch. Basal pleural appendage elongate, the tips very strongly recurved to appear like a shepherd's crook; distal pleural appendages two in number, one a flattened black blade that bears on its lateral angle a long, divergent, black spine (thumb); the second apical appendage is a slender pale rod that is feebly bent near mid-length. Gonapophyses appearing as two parallel blades that suggest in appearance a bird, the beak being the terminal black spine, the dorsal margin or back being microscopically toothed.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Greymouth, sea-level, September 7, 1921 (*T. R. Harris*).

*Paratype*, 1 ♂, alcoholic, Otira Gorge, January 10, 1920 (*J. W. Campbell*); 1 ♂, Kaituna, Banks Peninsula, Canterbury, September 11, 1921 (*J. W. Campbell*); 2 ♂♂, Charteris Bay, Canterbury, November 12, 1921 (*J. W. Campbell*).

*Amphineurus otagensis*, sp. n.

*Male*.—Length 3.8–4 mm.; wing 6–6.5 mm.

Generally similar to *A. harrisi*, differing as follows:—

Average size of body a little smaller. Antennae of male considerably longer than the body. Basal deflection of  $Cu_1$  before the fork of  $M$ , the distance a little greater than the basal deflection of  $M_{1+2}$ ; cell  $M_3$  petiolate, the petiole only a little shorter than the basal deflection of  $Cu_1$ . Male hypopygium with the ninth tergite somewhat as in *A. recurvans*, consisting of two straight rods that are feebly divergent; these rods are relatively very long and slender, the tips subacute; space separating the rods U-shaped. Pleurites produced into elongate, setiferous, digitiform lobes as in the genus. Basal pleural appendage a long, slender, acicular rod, very gently curved, tapering gradually to the acute blackened apex; apical pleural appendages two, one slender, rod-like, weakly sinuous, the second a large flattened blade that bears the usual lateral divergent spine (thumb), and, in addition, a smaller, more obtuse spine near the mid-distance to the apex, lying in the angle of the thumb; apex of this blade acute, blackened. Gonapophyses a little shorter than the penis-guard, tapering to the acute blackened tips, guard relatively slender, straight, on either side produced into a somewhat flaring wing.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dunedin (Waitati), Otago, October 24, 1921 (*M. N. Watt*).

*Paratopotypes*, 2 ♂♂; 3 ♂♂, 1 ♀, November 5, 1921; 2 ♂♂, 3 ♀♀, one pair *in copula*, November 26, 1921 (G. Howes); *paratype*, 1 ♀, Waipori, December 5, 1921 (G. Howes).

"Beaten from fern near stream." Types associated with *A. horni*, Edwards.

*Gnophomyia triton*, sp. n.

General coloration grey; antennæ black; mesonotal præscutum with three plumbeous-grey stripes, the median stripe divided; legs dark brown, the coxæ, trochanters, and femoral bases obscure yellow; tips of the femora and tibiæ black; wings with a blackish suffusion in the apical and posterior cells; *r* on *R*<sub>2</sub> close to the fork; male hypopygium with the pleural appendage elongate, tapering gradually to the simple acute apex.

*Male*.—Length 5·8–6 mm.; wing 7·2–7·3 mm.

Rostrum and palpi black. Antennæ black; basal flagellar segments cylindrical, subterminal segments more oval; last segment abruptly smaller. Head grey, lighter-coloured adjoining the inner margins of the eyes.

Mesonotal præscutum grey, very light grey laterally; three darker plumbeous-grey stripes, the median stripe indistinctly divided by a darker line; remainder of the mesonotum grey. Pleura and sternum clear grey. Halteres pale. Legs with the coxæ and trochanters obscure yellow; femora brown, yellow basally, the apices narrowly blackened; tibiæ brown, the tips black; tarsi black. Wings with a faint blackish suffusion in the cells distad of the cord and caudad of vein *Cu*<sub>1</sub>; a still darker suffusion along the cord; stigma conspicuous but small, elongate, blackish; veins dark brownish black. Venation: *Sc*<sub>1</sub> ending just before the end of *Rs*, *Sc*<sub>2</sub> longer than *Sc*<sub>1</sub> and located at its tip; *r* on *R*<sub>2</sub> immediately beyond the fork; basal deflection of *Cu*<sub>1</sub> just beyond the fork of *M*.

Abdomen brownish grey; sternites clearer grey, in some cases the sternum obscure yellow, the caudal margin ringed with paler. Male hypopygium with the pleural appendage elongate, tapering gradually to the simple acute apex, unarmed at base. Penis-guard trifid, before the apex being split into two needle-like divergent horns, from the centre of which projects the subequal apex of the guard. Gonapophyses flattened, projecting beyond the guard, the apex with a deep V-shaped notch, the lobes formed being obliquely truncated.

*Hub.* New Zealand (South Island).

*Holotype*, ♂, Greymouth, sea-level, September 7, 1921  
(*T. R. Harris*).

*Paratopotypes*, 4 ♂♂, 1 teneral.

*Gnophomyia triton* belongs to the same group as *G. flavopygialis*, Alex. (see discussion, *Ann. & Mag. Nat. Hist.* ser. 9, vol. ix. p. 150, 1922).

*Atarba (Atarba) viridicolor*, sp. n.

General coloration yellowish green; antennæ elongate; wings greenish yellow; *Sc* long; basal deflection of *Cu*<sub>1</sub> near mid-length of cell 1st *M*<sub>2</sub>.

*Female*.—Length 7·5 mm.; wing 7·2 mm.

Rostrum pale greenish yellow; palpi pale brown, the base greenish. Antennæ elongate, if bent backward extending about to the base of the third abdominal segment; scapal segments testaceous, tinged with green; basal flagellar segment testaceous; remaining flagellar segments black. Head pale greenish testaceous.

Mesonotum pale fawn-yellow, tinted with green, especially near the wing-root. Pleura similar to the notum, but very deeply tinged with light green—this colour undoubtedly very intense in fresh specimens. Halteres with the stem green, the knobs paler. Legs with the coxæ and trochanters light green; femora and tibiæ brownish yellow, the former tinged with green near base; tarsi gradually darkening to brownish black. Wings pale greenish yellow subhyaline; stigma faintly indicated; veins brown, tinged with green, deepest along costa. Venation: *Sc* long, *Sc*<sub>1</sub> ending a short distance before the fork of *Rs*, *Sc*<sub>2</sub> some distance from its tip, *Sc*<sub>1</sub> alone about two-thirds the basal deflection of *Cu*<sub>1</sub>; cell 1st *M*<sub>2</sub> elongate-pentagonal, gently widened distally, the veins beyond it rather long and slender; basal deflection of *Cu*<sub>1</sub> at or just beyond mid-length of the caudal face of the cell.

Abdomen pale brownish green, including the base of the ovipositor. Elongate tergal valves of the ovipositor straight, gently upcurved at their tips, green at base, passing into dark horn-colour.

*Hub.* New Zealand (North Island).

*Holotype*, ♀, Ohakune, altitude 2060 feet, October 11, 1921 (*T. R. Harris*).

*Paratopotype*, ♀, October 23, 1921.



*Limnophila maorica*, sp. n.

General coloration reddish brown; antennæ of male nearly as long as body; wings with a faint brown tinge; stigma and a faint seam along *r-m* darker brown; *r* near tip of  $R_1$ ;  $R_{2+3}$  short; basal deflection of  $Cu_1$  near one-fourth the length of cell 1st  $M_2$ ; male hypopygium with a long slender spine at base of dorsal face of pleurite.

*Male*.—Length 4.6–5 mm.; wing 6.3–6.5 mm.

*Female*.—Length 6.3 mm.; wing 7.3 mm.

Rostrum obscure yellow; palpi brownish black. Antennæ of the male elongated, only a little shorter than the body; scapal segments obscure brownish yellow; flagellum black, the segments elongate-cylindrical. Head dark brown, the occiput and genæ more rufous.

Mesonotum uniform reddish brown, the præscutal interspaces with a few erect black setæ. Pleura obscure brownish yellow. Halteres elongate, dark brown. Legs with the coxæ and trochanters obscure brownish yellow; femora dark brown, the bascs testaceous; remainder of the legs brownish black; tibial spurs small, reddish. Wings with a very faint brown tinge; stigma oval, pale brown; a pale brown seam along *r-m* and the deflection of  $R_{4+5}$ ; veins dark brown with abundant macrotrichiæ; a shiny black callus on the wing-root. Venation: *Sc* long,  $Sc_1$  ending beyond the fork of  $R_{2+3}$ ,  $Sc_2$  about one and one-half times its length from tip; *Rs* long, strongly angulated at origin;  $R_{2+3}$  short, approximately equal to the deflection of  $R_{4+5}$ , this length somewhat variable; *r* about its own length from the tip of  $R_1$ ; inner ends of cells  $R_3$ ,  $R_5$ , and 1st  $M_2$  in oblique alignment; petiole of cell  $M_1$  about equal to or longer than the second section of  $M_{1+2}$ ; *m* with macrotrichiæ, arcuated, usually about one-half longer than the outer deflection of  $M_3$ ; cell 1st  $M_2$  elongate; basal deflection of  $Cu_1$  near one-fourth the lower face of cell 1st  $M_2$ ; arculus broken.

Abdominal tergites dark brown, the basal half or less indistinctly paler; sternites obscure brownish yellow, the apices narrowly darker; hypopygium obscure yellow. Male hypopygium with the pleurites slender, the apex of each produced into a small chitinized point; two apical pleural appendages, the outer terminating in a slender chitinized point; at the base of the pleurites on the dorsal face a conspicuous chitinized rod that extends caudad into an acicular, feebly curved point. Penis-guard and gonapophyses fused into a conspicuous median structure. Anal tube distinct. Ovipositor with the valves elongate, the tergal valves acicular.

*Hub.* New Zealand (Both Islands).

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 1, 1921 (T. R. Harris).

*Allotype*, ♀, Greymouth, sea-level, September 7, 1921 (T. R. Harris).

*Paratopotypes*, 10 ♂♂, September 21 to October 11, 1921; *paratype*, 1 ♂, with the allotype; 3 ♂, 1 ♀, Dunedin, November 26, 1921 (G. Howes).

In its general appearance, *Limnophila maorica* somewhat suggests *L. delicatula*, Hutton, a very different fly.

*Limnophila maorica bispina*, subsp. n.

Very similar to the typical form, but the basal pleural appendage of the male hypopygium, instead of being a simple, very elongate rod, is shorter, stouter, at the tip split into two branches, the lateral branch short and straight, the mesally directed spine nearly four times the lateral spine, gradually narrowed to the acute apex where it is strongly curved.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Greymouth, sea-level, September 7, 1921 (T. R. Harris).

*Limnophila minifica*, sp. n.

General coloration light brown; mesonotal præscutum with three darker brown stripes; femora with conspicuous erect setæ on ventral face; wings with a pale brown tinge; stigma elongate, darker brown; cell  $M_1$  present, small; male hypopygium comparatively large and complicated in structure; eighth sternite terminating in a comb of blackened teeth.

*Male*.—Length about 4.8 mm.; wing 6.2 mm.

Rostrum dark grey-pruinose; palpi black. Antennæ broken. Head black with a sparse grey pubescence anteriorly, on the posterior part of the vertex more yellowish.

Pronotum almost white. Mesonotal præscutum light brown with three darker brown stripes; remainder of mesonotum badly crushed, the postnotum grey-pruinose. Pleura with a pale pollen, more pruinose posteriorly. Halteres pale. Legs with the coxæ yellow, the fore coxæ infuscated; trochanters pale; femora light brown, with long, conspicuous, erect setæ on the ventral face; tibiæ and tarsi brown. Wings with a pale brown tinge, the stigma elongate, darker brown; veins black. Venation:  $Sc$  long,  $Sc_2$  much longer than  $Sc_1$  and ending opposite the fork of  $Rs$ ;  $r$  faint, on  $R_2$  about one and one-half times its length beyond the fork;  $Rs$  in alignment with  $R_{2+3}$ ;  $R_{2+3}$  a little longer than

the deflection of  $R_{4+5}$ ; veins  $R_2$  and  $R_3$  generally parallel to the margin; inner ends of cells  $R_3$ ,  $R_5$ , and 1st  $M_2$  in alignment;  $r-m$  gently arcuate; cell  $M_1$  small, less than one-half its petiole; cell 1st  $M_2$  relatively small, the basal deflection of  $Cu_1$  near three-fifths its length; arculus unbroken.

Abdomen dark brown, the sternites a little paler; hypopygium obscure yellow. Male hypopygium unusually large and complicated in structure for a member of this genus. Ninth tergite terminating in two slender straight rods that lie parallel to one another. Pleurites produced caudad into slender black rods that are expanded at their tips and here weakly hairy; dorsad of these rods on either side arises a very long, pale, curved appendage, directed caudad, the tips mesad, the extreme apices blackened. Ninth sternite appearing as two subglobular setiferous lobes. Eighth sternite tapering to the apex, which bears a conspicuous comb of blackened teeth.

*Hab.* New Zealand (North Island)

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 10, 1921 (*T. R. Harris*).

*Gynoplistia concava*, sp. n.

General coloration grey-pruinose, the præscutum with three brown stripes; antennæ 17-segmented, femora yellowish-brown with a narrow, dark brown, subterminal ring; wings with a strong yellow tinge and conspicuous dark brown seams along the cord and at the origin of  $R_s$ ; abdominal tergites brown, the eighth tergite blackened; male hypopygium with the ninth tergite bearing a broad median lobe whose margin is gently concave.

*Male* —Length 14.5–15 mm.; wing 12.5–13.4 mm.

*Female* —Length 18 mm.; wing 14.5 mm.

Rostrum brown, sparsely pruinose, palpi dark brown. Antennæ 17-segmented, the formula being 2+2+7+6 or in cases 2+2+8+5, the tenth flagellar segment sometimes being pectinate; scapal segments reddish brown; basal segments of flagellum pale, the remainder dark brown, the pectinations black; terminal flagellar segment elongate, approximately twice as long as the subterminal segment; longest pectination (segment 8) about two and three-fourths the segment. Head dark-coloured, dull grey-pruinose.

Mesonotal præscutum grey with three brown stripes, the lateral stripes brighter brown and more distinct than the median vitta; pseudosutural foveæ deep horn-colour,

remainder of mesonotum grey-pruinose. Halteres pale. Legs with the coxæ brown, sparsely pruinose; trochanters obscure yellow; femora light yellowish brown with a narrow but distinct dark brown subterminal ring; tibiæ and metatarsi pale brown, the tips blackened; remainder of the tarsi black. Wings with a strong yellow tinge, cells *C* and *Sc* more brownish yellow; a conspicuous dark brown pattern distributed as follows: a quadrate blotch at origin of *Rs*, not attaining *M*; stigmal area oval with a conspicuous caudal extension along the cord to cell 1st *M*<sub>2</sub>; brown seams at *m* and on the basal deflection of *Cu*<sub>1</sub>; a brown spot on vein 1st *A* near two-thirds the length; wing-tip very faintly darkened; no dark mark at fork of *M*<sub>1+2</sub>; veins black. Venation: *Rs* very long, spurred at origin; *r* on *R*<sub>2</sub> from just beyond mid-length to two-thirds the length; petiole of cell *M*<sub>1</sub> longer than the second section of *M*<sub>1+2</sub>; basal deflection of *Cu*<sub>1</sub> near two-thirds the length of cell 1st *M*<sub>2</sub>.

Abdomen uniformly brown; eighth segment blackened; hypopygium obscure brownish yellow. Male hypopygium similar to that of *G. subfasciata* Walker, differing as follows: ninth tergite with a low broad median lobe, the caudal margin of which is gently concave. Black spinulose arms on mesal face of pleurites not so regularly globose, the small spinulose lobe near its base larger. Outer pleural appendage with the apex and subterminal spine shorter, the apex with more distinct denticles; inner pleural appendage with the elongate apex much more slender, tapering gradually to the subacute apex.

The female is full-winged; abdominal tergites brownish grey; ovipositor with the valves elongate.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2000 feet, October 3, 1921 (*T. R. Harris*).

*Allotype*, ♀, Taihupo, October 12, 1921 (*T. R. Harris*).

*Paratypes*, ♂, with the allotype; 4 ♀ ♀, October 22, 1921.

Allied to *G. subfasciata*, Walker, but very distinct in the structure of the hypopygium and the dark brown subterminal rings on the femora.

*Gynoplistia nebulipennis*, sp. n.

General coloration deep reddish brown; antennæ 16-segmented; head black; pleura very heavily and extensively silvery-white; halteres pale yellow; wings subhyaline with a very heavy, dark brown pattern, the apex broadly suffused

with darker; male hypopygium with the apex of each pleurite produced into a short blade; inner pleural appendage feebly bifid at apex.

*Male*.—Length 8.6–9 mm.; wing 8.5–9.4 mm.

Rostrum and palpi dark brown. Antennæ black; 16-segmented, the formula being  $2+2+9+3$ ; pectination of the third flagellar segment inserted at a slightly different plane from that of the basal two and the distal flagellar segments; flagellar pectinations of moderate length. Head black, sparsely brownish-grey pruinose anteriorly.

Mesonotal præscutum deep reddish brown with three indistinct darker brown stripes, the surface subshiny though covered with a sparse microscopic pubescence; scutum brown, the cephalic margin of the lobes blackened; scutellum and postnotum obscure yellowish brown, somewhat shiny. Pleura with a very heavy silvery-white microscopic pubescence that appears like a bloom; propleura dark brown, sending a narrow longitudinal stripe caudad on to the mesepisternum; mesosternum dark; a narrow, longitudinal, brown line on sides of mesosternum immediately dorsad of mid-coxæ. Halteres pale yellow. Legs with the coxæ concolorous with the pleura; trochanters brownish yellow; femora dark brown, the bases more reddish, more extensive on the middle and posterior femora; tibiæ and tarsi black, the posterior tibiæ paler with black tips. Wings subhyaline, the base and cells *C* and *Sc* brownish yellow; a very heavy dark brown pattern covers approximately one-half the wing-surface, including the following general areas: a large blotch at origin of *Rs* not attaining vein *M*; stigmal blotch sending a broad seam along the cord, interrupted only in the centre of cell 1st *M*<sub>2</sub>; wing-apex broadly darkened leaving pale areas only in the mid-third of cell *R*<sub>2</sub>, the second quarter of *R*<sub>3</sub>, and indistinct pale blotches in the centres of cells *R*<sub>5</sub>, 2nd *M*<sub>2</sub>, and *M*<sub>3</sub>, the two latter more extensive; cell *M* is largely suffused because of the unusually broad dark seams along veins *M*, *Cu*, and *Cu*<sub>2</sub>; a large dusky suffusion before mid-length of cell *Cu* and near the outer end of cell 1st *A*; other veins more or less seamed with dusky; veins dark. Venation: cell 2nd *R*<sub>1</sub> very small, *r* being at tip of *R*<sub>1</sub> and about three times its length from the tip of *R*<sub>2</sub>; petiole of cell *M*<sub>1</sub> about three times *m*; basal deflection of *Cu*<sub>1</sub> near two-thirds the length of the lower face of cell 1st *M*<sub>2</sub>. The right wing of the type shows a remarkable malformation of the veins, *R*<sub>4+5</sub> bending caudad and fusing with the third section of *M*<sub>1+2</sub> (petiole of cell *M*<sub>1</sub>) for almost the entire length of the latter.

Abdominal tergites dark brown, the intermediate segments

with an obscure yellow area at base on either side of the median line; hypopygium shiny yellow; sternites obscure yellowish brown, the subterminal segments faintly darker. Male hypopygium with the pleurites stout, the apical angle produced caudad into a conspicuous pale blade. The mesal apical angle of the pleurite also produced into a triangular point; two pleural appendages, the inner one slender, curved at the apex which is feebly bifid and blackened. Gonapophyses appearing as slender blades that are directed caudad, the tips slightly mesad.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Greymouth, sea-level, September 6, 1921 (T. R. Harris).

*Paratopotype*, ♂.

*Macromastix atridorsum*, sp. n.

General coloration obscure yellow; dorsum of præscutum black with four greyish-plumbeous stripes; antennæ short; wings subhyaline; stigma pale brown; veins *Sc* and *R* subcoalescent distally; *r* lacking; basal deflection of *Cu*<sub>1</sub> close to inner end of cell 1st *M*<sub>2</sub>; abdominal tergites black, the basal sternites obscure yellow.

*Male*.—Length about 8 mm.; wings 10 mm.

Frontal prolongation of the head brown; nasus lacking; palpi brownish black. Antennæ short, black, the basal scapal segment brownish testaceous. Front yellowish pollinose; remainder of dorsum brownish grey.

Pronotum brown. Mesonotal præscutum black with four dark grey-plumbeous stripes, the extreme lateral margins, humeral region and centre of the V-shaped suture obscure yellowish; scutal lobes black, the posterior and lateral margins fading into obscure yellow; scutellum and postnotum obscure yellow, the posterior margin of the latter narrowly infuscated. Thorax glabrous. Pleura obscure yellow; mesosternum infuscated. Halteres brown, the extreme base of the stem yellow. Legs with the coxæ yellow, the base of the fore coxa infuscated; trochanters yellow; femora dark brown, the bases obscure yellow; remainder of the legs brownish black; legs long and slender. Wings subhyaline; stigma pale brown, filling cell *Sc*<sub>1</sub> and the distal half of cell *R*<sub>1</sub>; veins brownish black. Venation: *Sc*<sub>1</sub> present; veins *Sc* and *R* almost completely coalesced on their distal half; *Rs* feebly angulate before mid-length; *r* completely lacking; cell 1st *M*<sub>2</sub> almost quadrangular,

widest basally; *m-cu* immediately beyond the fork of *M*, so the basal section of *M*<sub>3</sub> is almost lacking; petiole of cell *M*<sub>1</sub> equal to or a little shorter than the second section of *M*<sub>1+2</sub> and in alignment with it; cell 2*nd A* broad.

Abdomen with the basal tergite dark brown; remaining tergites black; sternites obscure yellow, segments 6 to 9 and the caudal margin of 5 infuscated. Male hypopygium inverted as in the genus, the ninth tergite occupying a ventral position, consisting of two rounded black lobes that are separated by a deep U-shaped notch.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 10, 1921 (T. R. Harris).

### XXXIX.—Two new Jerboa-rats (Notomys).

By OLDFIELD THOMAS.

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AMONG the mammals collected by the late Mr. W. Stalker in the neighbourhood of Alexandria, Northern Territory of Australia, is a nice series of a jerboa-rat from Alroy, which in my account of the collection was recorded as *Notomys mitchelli*\*—a determination which was accepted in my recent notes on the genus *Notomys*†.

There appeared, however, to be some doubt as to what the true *Notomys mitchelli* of the Lower Murray River was, and I appealed to Mr. Troughton at Sydney for information about the type, while in the meantime the characters of the species were drawn up from the Alroy series.

Mr. Troughton now tells me that he has examined the incisors of the original specimens of "*Dipus mitchelli*," and finds that they are distinctly orthodont, not opisthodont as in our northern specimens and as stated in my description of the species.

Since writing the paper on *Notomys*, I have had lent me by the Liverpool Museum a number of Australian Muridæ received by them from Mr. Gould, and among these there are two jerboa-rats (nos. 246 and 246*a*) from the Gawler

\* P. Z. S. 1906, p. 539.

† Ann. & Mag. Nat. Hist. (9) viii. p. 536 (1921).

River, S. Australia, which, having an incisive index of  $70^{\circ}$ – $71^{\circ}$ , I thought must be new if *mitchelli* proved to be opisthodont; but, now that we know it to be orthodont, they may be fairly safely assigned to that species, being the only specimens in this country with a recorded locality. In the British Museum we possess one specimen, without incisors, from "New South Wales," collected by Mr. Stutchbury, and another, of more doubtful determination, from "Australia" (Gould Collection). Whether the species is now completely exterminated we do not know.

The Alroy specimens would seem to demand description as new :—

*Notomys alexis*, sp. n.

Size of *N. mitchelli*. General colour sandy brown, paler than in *mitchelli*, but darker and browner than in *cervinus*. Sides paler sandy. Under surface well-defined white, the hairs with slaty bases except on the throat and chest, where they are white to the roots. Ears of medium length. Hands and feet quite white. Tail fairly long, well pencilled for its terminal third; above sandy for its proximal half, then blackish to the tip, below white throughout, the two colours well contrasted terminally.

Skull of fairly normal shape, not with enlarged brain-case as in *cervinus*. Palatal foramina rather narrow and little open. Mesopterygoid fossa narrow, scarcely broadened in front, very different from those of *cervinus* in this respect, but agreeing with those of *mitchelli*. Bullæ rather large.

Incisors of all the specimens, old and young, markedly opisthodont, their index commonly about  $51^{\circ}$  to  $56^{\circ}$ .

Dimensions of the type (measured in the flesh) :—

Head and body 109 mm.; tail 135; hind foot 32; ear 21.

Skull: greatest length 30; condylo-incisive length 28; zygomatic breadth 17; nasals 10; interorbital breadth 5.2; breadth of brain-case 15; palatilar length 13.3; palatal foramina  $5.6 \times 1.8$ ; breadth of mesopterygoid fossa 1.7; length of bulla 6; upper molar series 5.1.

*Hab.* Region of Alexandria, Northern Territory of Australia. Type from 35 miles S.W. of Alroy, about  $135^{\circ} 40' E.$  and  $19^{\circ} 30' S.$  Alt. 800'.

*Type.* Old female. B.M. no. 6.3.9.35. Original number 151. Collected 29th July, 1905, by W. Stalker. Presented by Sir W. Ingram and the Hon. John Forrest. Fifteen specimens examined.



From Mr. Troughton I further gather that there are no specimens in Sydney recognized as authentic examples of Sturt's *conditor*, and I have therefore again had to consider how to deal with the *Notomys* skull referred to in the last paragraph of my 1921 paper on the genus.

The locality of this skull was the Darling Downs, a region high up on the Dividing range in about latitude 28°, while the original home of *conditor* was near Laidey's Ponds, on the Lower Darling, near its junction with the Murray, at a distance of something like 600 miles from the Darling Downs, at a lower altitude and in a much more desert-region.

Under these circumstances, to identify our Darling-Downs skull with *conditor* would be mere guesswork, and I therefore propose to describe it as new :—

*Notomys mordax*, sp. n.

Size about as in *N. gouldi*, but the general build stouter throughout. External characters unknown. Skull broad, strongly built, with widely open anteorbital foramina and broad frontal region. Interorbital space comparatively broad. Palatal foramina long, well open, extending back past the anterior root of  $m^1$ . Mesopterygoid fossa fairly broad, but not specially broadened anteriorly, its sides practically parallel. Bullæ rather small for the bulk of the animal, though slightly larger than in *gouldi*; conspicuously smaller than in the large *longicaudatus*.

Teeth large and heavy. Incisors orthodont, unusually broad and strong, as broad but not as deep as in *longicaudatus*, flatter and less bevelled in front.

Measurements of the type-skull :—

Greatest length 33·5 mm.; condylo-incisive length 30; zygomatic breadth 19·3; nasals 12·6; interorbital breadth 5·9; breadth between outer corners of anteorbital foramina 9·7; breadth of brain-case 16·7; palatilar length 15; palatal foramina 6·8 × 2·1; breadth of mesopterygoid fossa 2·4; length of bulla 7; upper molar series 6·3.

*Hab.* Darling Downs, S. Queensland.

*Type.* Adult skull. B.M. no. 46. 4. 4. 65. Gould Collection.

Readily distinguishable from all species of which the skull is known by its robust build and heavy incisors.

XLI.—*Three new Fishes from Zululand and Natal, collected by Mr. H. W. Bell Marley; with Additions to the Fish Fauna of Natal.* By J. R. NORMAN.

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I.—DESCRIPTIONS OF NEW SPECIES.

*Rhinobatus holcorhynchus*, sp. n.

Snout long and obtusely pointed, its præorbital length nearly twice the distance between outer margins of eyes, and its præoral length  $3\frac{1}{2}$  times width of mouth. Rostral cartilage strong; ridges widely separated, nearly parallel, slightly converging anteriorly. Diameter of eye 4 times in præoral length of snout; that of eye + spiracle  $1\frac{2}{3}$  times interorbital width. Spiracle with two folds, the outer much more prominent than the inner. Nostrils wide,  $\frac{1}{2}$  width of mouth, and nearly twice that of the internarial space. The anterior nasal valve extends inwards as far as level of inner edge of nostril, so that valves and nostrils are separated by an interspace of equal length. Mouth straight; 64 rows of teeth in upper jaw. Dorsals equal, elevated; the base of the first equal to its distance from extremities of pelvics, and slightly less than  $\frac{1}{3}$  of its distance from second dorsal. Caudal narrow. A distinct series of tubercles in the median line of the back, extending nearly as far as second dorsal; a group of 3 or 4 on shoulder, 7 or 8 in front of orbit, and 3 or 4 above spiracle. Back uniform greyish brown, lighter at sides of rostrum and edges of pelvics; a black blotch beneath extremity of snout.

A single specimen, 28 inches in total length, from the Zululand coast, at a depth of 45 fathoms.

This species appears to be related to *R. leucorhynchus*, Günth.

*Holacanthus acanthops*, sp. n.

Depth of body twice in the length, length of head  $3\frac{1}{4}$ . Snout not quite  $\frac{1}{2}$  diameter of eye, which is  $2\frac{1}{4}$  in length of head. Interorbital width 3 in head. Præoperculum with the vertical margin denticulated; a strong spine at the angle, slightly more than  $\frac{1}{2}$  length of head, not reaching vertical from posterior margin of operculum. Suboperculum serrated. Suborbital with a strong backwardly directed spine,  $\frac{1}{4}$  length

of head. Dorsal XIV 16; third spine strongest and longest,  $\frac{1}{2}$  length of head; soft fin rounded. Pectoral as long as head, reaching origin of anal or a little beyond; pelvics slightly shorter, with the first and second rays produced, reaching origin of anal. Anal III 17; obtusely pointed. Caudal subtruncate. Scales strongly ctenoid, of moderate size; 4 from origin of dorsal to lateral line, which is arched over the pectoral, extends along back near base of dorsal, and ends near end of soft dorsal. Colour:—Head, back, caudal, dorsal, and pectoral fins yellow, rest of fish dusky brown; dorsal with a narrow dark edge.

A single specimen, 36 mm. in total length, from Durban.

It appears to be related to *H. fisheri*, Snyder, 1902, from the Hawaiian Islands, which has three prominent spines on each suborbital.

*Sciaenamarleyi*, sp. n.

Depth of body  $3\frac{2}{3}$  in the length, length of head 3. Snout equal to diameter of eye, which is 4 in length of head and equals interorbital width. Snout obtuse and rounded; jaws equal anteriorly; outer teeth strong; maxillary extending a little beyond middle of eye; four open pores beneath the symphysis of lower jaw. Vertical margin of præoperculum indistinctly serrated; angle rounded, with three distinct teeth; operculum with two weak flat spines. 12 gill-rakers on lower part of anterior arch. Dorsal X, I 30; spines slender, third or fourth longest, a little more than  $\frac{2}{3}$  length of head, as long as longest soft rays. Anal II 7; spines pungent, rather stouter than dorsals, second  $\frac{2}{3}$  length of head. Pectoral  $\frac{7}{8}$  length of head. Pelvics shorter,  $\frac{3}{4}$  length of head. Caudal pointed (?). Scales ciliated on body, cycloid on head; about 52 in lateral line, and 6 from origin of dorsal to lateral line. Silvery; back darker; a dark opercular spot; a small blackish spot superiorly in axil of pectoral.

A single specimen, 200 mm. in total length, from off St. John's River, at a depth of 40–50 fathoms.

## II.—LIST OF SPECIES NEW TO THE FISH FAUNA OF NATAL.

### SELACHII.

#### Hexanchidæ.

*Hexanchus griseus*, Müll. & Henle.

#### Carchariidæ.

*Galeus canis*, Rondel.  
*Sphyrna zygaena*, Linn.

**Pristidæ.**

*Pristis pectinatus*, Latham.

**Trygonidæ.**

*Trygon pastinaca*, Linn.

**TELEOSTEI.****Clupeidæ.**

*Harengula punctata*, Rüpp.

— *vittata*, Cuv. & Val.

*Engraulis capensis*, Gilchr.

**Congridæ.**

*Conger marginatus*, Val.

**Synodontidæ.**

*Saurus varius*, Lacep.

*Saurida nebulosa*, Cuv. & Val.

**Macrorhamphosidæ.**

*Macrorhamphosus velitaris*, Pall.

**Solenostomidæ.**

*Solenostoma cyanopteron*, Bleek.

**Syngnathidæ.**

*Hippocampus kudu*, Bleek.

— *polykenia*, Bleek.

*Gastrotekeus biaculeatus*, Bloch.

**Scombresocidæ.**

*Petalichthys capensis*, Regan.

**Exocoetidæ.**

*Exocoetus hillianus*, Gosse.

**Mugilidæ.**

*Mugil crenulabris*, Forsk.

**Stromateidæ.**

*Psenes cyanophrys*, Linn.

*Stromateus fiatola*, Cuv. & Val.

**Holocentridæ.**

*Myripristis murdjan*, Cuv. & Val.

**Pempheridæ.**

*Pempheris schwenkii*, Bleek.

**Serranidæ.**

- Epinephelus diacanthus*, Bleek.  
 — *gilberti*, Richards.  
 — *gigas*, Blunn.

**Chilodipteridæ.**

- Apogon macropterus*, Kuhl & van Hass.

**Carangidæ.**

- Caranx kurra*, Cuv. & Val.  
*Nucliates ductor*, Cuv. & Val.  
*Seriola bonariensis*, Cuv. & Val.  
*Lichia ama*, Lacep.

**Centropomidæ.**

- Ambassis commersonii*, Cuv. & Val.  
 — *dussumieri*, Cuv. & Val.

**Lutianidæ.**

- Lutianus analis*, Cuv. & Val.

**Mullidæ.**

- Upeneus spilurus*, Bleek.  
 — *cyclostoma*, Cuv. & Val.

**Sciaenidæ.**

- Sciaena vogleri*, Bleek.  
 — *belangeri*, Cuv. & Val.

**Pomadasidæ.**

- Pomadasis maculatus*, Bloch.  
*Diagramma punctatum*, Cuv. & Val.

**Scorpididæ.**

- Pelamys orientalis*, Schleg.

**Ephippidæ.**

- Ephippus orbis*, Cuv. & Val.

**Chætodontidæ.**

- Holacanthus striatus*, Rupp.

**Cirrhitidæ.**

- Cirrhitichthys maculatus*, Lacep.

**Chilodactylidæ.**

- Chilodactylus brachydactylus*, Cuv. & Val.

**Acanthuridæ.**

- Zanclus canescens*, Artedi.

## Pomacentridæ.

- Glyphidodon notatus*, Day.  
 — *antjerius*, Bleek.  
 — *florentulus*, Gunth.

## Labridæ.

- Labroides dimidiatus*, Cuv. & Val.  
*Julis bicolor*, Gunth.  
*Stethojulis phakadopleura*, Bleek.  
 — *interrupta*, Gunth.  
 — *kalosoma*, Bleek.  
*Cossyphus bilunulatus*, Lacep.  
*Novacula tetrazona*, Bleek.  
 — *pentadactyla*, Linn.

## Gobiidæ.

- Gobius aeneofuscus*, Peters.  
 — *capistratus*, Peters.

## Echeneididæ.

- Echeneis albescens*, Schleg.

## Scorpænidæ.

- Pterois brachyptera*, Cuv. & Val.

## Hoplichthyidæ.

- Hoplichthys acanthopleurus*, Regan.

## Blenniidæ.

- Blennius hyphenetes*, Klunz.  
 — *capito*, Cuv. & Val.  
*Salarias periophthalmus*, Cuv. & Val.  
*Xiphasia setifer*, Swainson.

## Clinidæ.

- Trypterygium obtusirostre*, Klunz.  
 — *pusillum*, Klunz.

## Tetrodontidæ.

- Spheroides spinosissimus*, Regan.

## Diodontidæ.

- Diodon maculatus*, Gunth.

## Pleuronectidæ.

- Cynoglossus lula*, Bleek.

XLI.—*The First Eremochætaous Dipteron with Vestigial Wings.* By Prof. M. BEZZI, Turin, Italy.

IN my paper on the reduction and disappearance of the wings in the Diptera\* I have pointed out the fact that this phenomenon is very rare in the suborder of the Diptera Brachycera. In a total of 384 cases observed (adding to my list on pp. 165–182 those appended at end of the present paper), we have the following figures:—

Suborder Orthorrhapha Nematocera . . .	140
Orthorrhapha Brachycera . . .	12
Cycloirrhapha Athericera . . .	232

And even the few species of the Brachycera are represented exclusively by some Empididæ and Dolichopodidæ, both belonging to the same group of the Orthogenya (Microphona). All the other groups of the suborder are exempt (the Hypocera being placed with the Cycloirrhapha); in the Eneigopoda there are a few Asilidæ in which the wings show a tendency towards reduction both in the size and in venation, but these cases seem to be unworthy of consideration. It was therefore with the greatest interest that I received, some months ago, through the courtesy of Dr. Charles P. Alexander, Urbana, Ill., U.S.A., two specimens of a subapterous Dipteron from Tasmania, sent to him with a collection of Tipulidæ. On a superficial examination the insect is indeed very like a wingless female of the genus *Tipula*, of which there are numerous cases in all parts of the world. It was first believed to be a Bibionid or a Rhagionid (Leptid), but at once I recognized in it a Chironomyzid, judging it to be a wingless female of some Australian species of *Chironomyza* or of *Metoponia*.

In the meantime, a paper† by Mr. G. H. Hardy, of the Australian Museum, Sydney, N.S.W., has appeared, in which an insect almost identical is described as a new genus and species under the name of *Boreoides subulatus*, with the interesting notice that it has been preserved for many years in the Melbourne Museum under the MS. name of *Boreomyia subulata*, Walker. The genus is considered to be nearly allied to *Chironomyza*. I am also of the same opinion. The atrophied mouth-parts, the form of the head and antennæ, the

\* “Riduzione e scomparsa delle ali negli Insetti Ditteri,” Rivista di Sci. Nat. “Natura,” Milano, vol. vii. 1916, pp. 85–182, 11 figs.

† “A Revision of the Chironomyzini (Diptera),” Proc. Linn. Soc. N.S.W. xlv. 1920, pp. 532–542, pls. xxix., xxx.

greatly developed and bisected front coxæ, the subulate abdomen of the female with the last segments ovipositor-like, are as in the South-American forms of *Chiromyza*, in which there is also a great difference of size in the sexes\*.

It is important to notice that this first Stratiomyiid with vestigial wings is so advanced in wing-reduction, being nearly apterous and with the posterior part of the thorax undeveloped. It seems to be not rare in New South Wales and Victoria, the times of appearance being February, March, and May; most specimens have been found in the mountains.

In my opinion the Australian species of *Chiromyza* belong to a genus different from the true South-American one, the third longitudinal vein being typically forked (even if Mr. Hardy has shown the variability of this character) in Australian species, while it is typically simple in the American ones. In this case the name *Boreoides* can be used for the Australian *Chiromyza*'s, even for those with normally winged females. The apterous condition of the female sex only is not of generic value, as shown, for example, by the genus *Tipula*.

In a recent paper by Dr. G. Enderlein ("Ueber die phyletisch älteren Stratiomyidensubfamilien," in Mitteil. Zoolog. Mus. Berlin, x. 1921, pp. 153-214) a new genus *Archimyza* was erected for what seems to be the species described and figured by Hardy under the name of *Chiromyza australis*, Macquart.

In comparing the two Tasmanian specimens before me with the figures and descriptions of the type-species *subulatus*, I have found some differences of great value, and it seems better to separate them as a new form, although on p. 541 of his paper Mr. Hardy says:—"Specimens from Tasmania taken on the summit of Mt. Wellington, and one taken by Mr. C. E. Cole near Bellerive, Hobart, undoubtedly belong to this species, but unfortunately they are not available for study at the time of writing this paper."

*Boreoides tasmaniensis*, sp. n., ♀. (See figure.)

Type-female and an additional specimen of same sex in the South Australian Museum from Hobart, Tasmania (*Lea*).

Length of body 16-17 mm.

Agreeing with Hardy's description and figure of *subulatus* female, but differing in the following points:—

(a) The third antennal joint has the annulation very distinct and deep, being divided into three parts.

\* Several pairs of *Chiromyza fuscana*, Wied., from Paraguay in my collection, taken in copula by Mr. Schrottky, measure 8-9 mm. in length in the males and 15-17 mm. in the females.



(b) There is no distinct scutellum; the back of the mesonotum presents only indistinct furrows close to its posterior border, from which the scutellum or the metanotum cannot be recognized. This is well shown in the photograph.

(c) In consequence of this reduction of the distal part of the thorax the posterior coxæ are placed in contact with the intermediate ones.

(d) The rudiments of the wings are well developed, being much more than "minute prominences." In the type-specimen they are 2 mm. long, and have a stalk-like basal part and a dilated terminal portion. The rudiments of the halteres are less developed.

(e) The back of the mesonotum has a distinct pattern, being reddish yellow, with a broad, longitudinal, complete



*Boreoides tasmaniensis*, sp. n., ♀. Hobart, Tasmania; type and co-type in South Australian Museum. Enlarged photo. by Rag. A. Lucchetti, Turin.

blackish stripe, which ends in front of the first posterior furrow. The abdominal pattern, when distinguishable, is the same as in *subulatus*.

*Additional Note.*—Since this was written, I have received, through the courtesy of Mr. Hardy, a female paratype of his *Boreoides subulatus*. Comparing this specimen with the type of *Bor. tasmaniensis*, I have found that the differences in the annulation of third antennal joint and in the position of hind coxæ are not constant, being similar in the two species. On the other hand, there are very important differences in the shape of scutellum, in the length of wing-rudiments, and in the coloration of the back of mesonotum. I find, moreover, that the legs of *tasmaniensis* are considerably more thin and

slender than those of *subulatus*; in this latter species the hind tarsi are distinctly thickened, while in *tasmaniensis* they are thin. The colour of the legs is, moreover, much lighter in *tasmaniensis*, the tibiæ and tarsi being entirely yellowish, while in *subulatus* they are mainly black.

# ADDITIONS TO MY CATALOGUE OF THE DESCRIBED DIPTERA WITH REDUCED OR ABORTED WINGS.

Most of the following species have been described subsequently to the preparation of my paper of 1916, or, owing to the war, have not come to my knowledge; a few of the older records have been previously overlooked by me.

With the following 45 additions the number of cases observed (corresponding exclusively to degrees 3-8 of my gradation, pp. 99-110) amounts to 384.

## I. ORTHORRHAPHA NEMATOCERA (140).

### Fam. Tanyderidæ (1).

3. *Protoplasa vanduzeei*, Alexander, Ent. News, xxix. p. 285 (1918).—California.

### Fam. Tipulidæ (28).

3. *Tipula variipennis*, Meigen, Syst. Besch. i. p. 183 (1818).—Europe.
3. *T. luteipennis*, Meigen, Syst. Besch. vi. p. 288 (1830).—Europe.
5. *T. gynapteria*, Alexander, Journ. N.Y. Ent. Soc. xxvi. p. 72 (1918).—Siberia.
5. *T. rothschildi*, Alexander, Bull. Mus. Paris, 1920, p. 318 (1920).—Abyssinia.
5. *T. imperfecta*, Riedel, Voy. All.-Jeann., Dipt. iii. p. 94 (1914).—Kilimandjaro, Africa.
5. *T. chionoides*, Alexander, Ann. S. Afr. Mus. xvii. p. 164, fig. 2 (1917).—South Africa.
4. *T. subapterogyne*, Alexander, Ann. Ent. Soc. Amer. xiii. p. 266 (1920).—Formosa.
5. *T. whitneyi*, Alexander, Journ. N.Y. Ent. Soc. xxvi. p. 73 (1918).—Pribilof Islands.
4. *T. abortiva*, Alexander, Ent. News, xxv. p. 358 (1914).—Peru.
6. *Longurio micropteryx*, Alexander, Ann. S. Afr. Mus. xviii. p. 217 (1921).—South Africa.

### Fam. Limoniidæ (30).

4. *Tricyphona hannai*, Alexander, Can. Ent. 1917, p. 209.—Pribilof Islands.
3. *Tr. degenerata*, Alexander, Can. Ent. 1917, p. 207.—Colorado, U.S.A.
3. *Gynoplistia bona*, Alexander, Ins. Insc. menstr. 1920, p. 123.—New Zealand.
3. *Limnophila rhionoptiloides*, Alexander, Can. Arct. Exped. 1919, p. 6 c (1919).—N.W. Arctic Territories.

4. *L. subaptera*, Alexander, Can. Ent. 1917, p. 207; and Proc. Cal. Acad. Sci. x. p. 38 (1920).—California.
5. *Platylimnobia barnardi*, Alexander, Ann. S. African Mus. xvii. p. 150, fig. 1 (1917).—South Africa.
5. *Plat. pumila*, Alexander, Ann. S. African Mus. xviii. p. 196 (1921).—South Africa.
4. *Eruptera* sp., Riedel, Voy. All.-Jean., Dipt. iii. p. 83 (1914).—Kilimandjaro, Africa.
8. *Chionea primitiva*, Alexander, Can. Ent. 1917, p. 204.—New York, U.S.A.
8. *Ch. gracilis*, Alexander, Can. Ent. 1917, p. 206.—New York, U.S.A.
8. *Ch. noveboracensis*, Alexander, Can. Ent. 1917, p. 205.—New York, U.S.A.

Fam. Scatopsidæ (2).

3. *Coboldia formicarum*, Melander, St. Coll. of Wash., Bull. 130, p. 17, pl. i. fig. 4 (1916).—Wisconsin, U.S.A.

Fam. Sciaridæ (32).

8. *Epidapus absoloni*, Czizek, Wien. ent. Zeit. xxxiv. p. 374 (1915).—Europe.
8. *Landrockia moravica*, Czizek, Wien. ent. Zeit. xxxvi. p. 290, fig. (1917).—Europe.
4. *Sciara heteroptera*, De Meijere, Tijdschr. v. Entom. lvi. p. 318 (1913).—Java.

II. ORTHORRHAPHA BRACHYCERA (12).

Fam. Stratiomyidæ (2).

6. *Boreoides subulatus*, Hardy, Proc. Linn. Soc. N.S.W. xlv. p. 540, pl. xxx. figs. 17-22 (1920).—Australia.
6. *Bor. tasmaniensis*, Bezzi, described in the present paper (1922).—Tasmania.

Fam. Empididæ (8).

8. *Pieltainia iberica*, Arias, Bol. Soc. Esp. Hist. Nat. 1919, p. 479, figs. 1-12.—Spain. This is the undetermined genus and species of the first list.
5. *Geodromia subaptera*, Arias *in litt.* (1920).—Spain.

III. CYCLORRHAPHA ATERICERA (232).

Fam. Phoridæ (85).

8. *Ptochomyia afra*, Silvestri, Bull. Lab. Zool. Portici, xiv. p. 275, figs. iii.-ix. (1921).—Cameroon, Africa. With the var. *parviceps* (Nigeria) and *laticeps* (French Guinea).
8. *Chonocephalus jamaicensis*, Brues, Psyche, xxii. p. 102 (1915).—Jamaica.
8. *Stethopathusa corporali*, Schmitz, Bol. Soc. ent. España, 1921, p. 96, fig.—Sumatra\*.

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\* In this same paper Schmitz has the two new genera *in litt.*, *Neopuliciphora* and *Aptinandria*, this last with both the sexes apterous.

Fam. **Borboridæ** (15).

4. *Leptocera* (*Scotophilella*) *pseudonivalis*, Dahl, Sitzber. Ges. naturf. Freunde Berlin, 1909, p. 369; Duda, 1918.—Europe.
4. *Lept.* (*Puncticorpus*) *brevipennis*, Duda, Abhandl. zool.-bot. Ges. Wien, x. p. 93, pl. vi. fig. 17 (1918).—Germany\*.

Fam **Drosophilidæ** (2).

3. *Drosophila notabilis*, Lamb, Trans. Linn. Soc. London, 1914, p. 329, fig. 16.—Seychelles Islands.
3. *Oxycamulla acutipennis*, Loew, Berl. ent. Zeitschr. ix. p. 269 (1865).—South Europe, Mediterranean countries.

Fam. **Oscinidæ** (6).

4. *Neuropachys brachyptera*, Thalhammer, Mem. Ann. Soc. Sci. Bruxelles, xxxvii. p. 342 (1913).—Belgium.
6. *Myrmecosepsis hystrix*, Kertész, Ann. Mus. nat. Hung. xii. p. 244, figs. 1-2 (1914).—Formosa.

Fam. **Geomyzidæ** (5).

3. *Mutloptera apicalis*, Meigen, Syst. Besch. vi. p. 109 (1830); *terminalis*, Zetterstedt, Dipt. Scand. vi. p. 2533 (1847).—North and Middle Europe.
4. *Mut. alluaudi*, Hendel, Deutsch. entom. Zeitschr. 1917, p. 39, fig. 3. —Kilimandjaro, Africa. In this same paper, p. 39, Hendel has changed the name of the North-American *Mut. apicalis*, Coquillett, to *Mut. coquilletti*, Hendel.

Fam. **Ortalidæ** (1).

3. *Steneretma laticauda*, Loew, Mon. N.A. Dipt. iii. p. 187 (1873).—Texas, U.S.A.

Fam. **Hippoboscidæ** (30).

- Lipoptena pauciseta*, Edwards, Journ. Fed. Malay St. Mus. viii. p. 55, figs. 27, 28 (1919).—Sumatra.

Fam. **Nycteribiidæ** (58).

8. *Penicillidia corynorhina*, Ferris, Ent. News, xxvii. p. 435, pl. xxiii. fig. 3 (1916).—U.S.A.
8. *Pen. majuscula*, Edwards, Journ. Fed. Malay St. Mus. viii. p. 58 (1919).—Sumatra.
8. *Eremoctenia progressa*, Muir, Bull. Mus. Zool. Harvard, liv. p. 351, pl. ii. figs. 8, 10 (1912); Scott, 1917.—Amboina.
8. *Basilia silvæ*, Brèthes, Bol. Mus. nacion. 1913, p. 1.—Chile.

\* *Leptocera paradoxa*, Stenhammar, is considered by Duda, 1918, as a synonym of *Pteremis nivalis*, Hal.

XLII.—*Some new Brazilian Gonyleptidæ.* By MELLO-LEITÃO, M.D., Fellow of the Brazilian Academy of Sciences and of the Entomological Society of France.

I HAVE strictly followed in this paper Roewer's systematic arrangement of Opiliones. The new genera and species here described are all found in the collections of the Museums of São Paulo and Rio de Janeiro and of my own.

Subfam. *PACHYLINÆ*.

Genus *NEOPUCROLIA*, Roewer, 1913.

*Neopucrolia bituberculata*, sp. n.

♀.—7 mm.

Anterior margin of the cephalothorax smooth. Eye-turret as a high bifid tubercle, with two small apical spines. Abdominal scutum with the sides evenly rounded, widening to the level of area iii., and then narrowing and making a right angle with the posterior margin of the scutum. Abdominal scutum with five transverse striæ, i.-ii. and iv.-v. united by a longitudinal groove; lateral fields with a row of minute granules; the median fields smooth; iii. with two low tubercles; i., ii., iv., and v. unarmed. Abdominal free dorsal segments smooth and unarmed. Legs i.-iii. slender and weak; legs iv. stronger and longer than the others together; all the femora curved. Anterior tarsus with five joints, tarsi iii. and iv. with six. The femur of the pedipalp with an apical inner spine and with the low surface spined.

*Hab.* Alto da Serra (S. Paulo).

Type in the S. Paulo Museum.

Genus *UROPACHYLUS*, nov.

Eye-turret elevated in a median cone. Cephalothorax narrow. Margins of the abdominal scutum evenly rounded at the sides to groove v., then narrowing and making a right angle with the hinder margin. Dorsal scutum with five transverse grooves, i. and ii. united by a longitudinal groove. Field i. with two low tubercles; ii. unarmed; iii. with two median spines; iv., v., and dorsal free segments i. and ii. unarmed; dorsal free segment iii. with a strong median spine; anal dorsal plate unarmed. Coxæ i.-iii. weak and parallel; coxa iv. twice stronger and

longer than the three others together. Chelicerae normal and equal in the two sexes. Pedipalps shorter than body; femur unarmed, without apical inner spine. Legs short and stout. Tarsus i. with 3-5 joints, ii. with more than 6; iii. and iv. with 6. Tarsi iii. and iv. with terminal claws without teeth.

Type.

*Uropachylus striatus*, sp. n.

♂.—5 mm.

Anterior margin of the cephalothorax smooth; portion before the eye-turret with a small blunt elevation, all the rest smooth. Eye-turret with a strong median spine. Field i. of the abdominal scutum with two stronger and two weaker tubercles; ii. with numerous granules unevenly disposed, forming a median gathering; iii. with two high spines and some granules at the base; iv., v., and dorsal free segments i. and ii. with a transverse row of granules. Dorsal free segment iii. with a strong median spine and a transverse row of granules; anal dorsal plate with two rows of granules. All the ventral surface smooth. Coxa iv. very granular and with a small apical inner spine. The body is black, with transverse and longitudinal grooves brown; marginal fields testaceous; in the dorsal free segments narrow light bands; ventral free segments with a row of small light points and a brown line; stigmatic segment brown-yellow with an asteriform (Λ) black figure. Pedipalps and anterior legs spotted; legs iii. and iv. chestnut.

*Hab.* Pinheiro (Rio de Janeiro).

Type in the S. Paulo Museum.

Genus *METEUSARCOIDES*, nov.

Eye-turret closer to the anterior margin than to first transverse groove, very high, blunt, with a small median tubercle. Dorsal scutum with five transverse grooves, i. and ii. united by a longitudinal groove. Cephalothorax narrow; margins of the abdominal scutum evenly rounded to groove iv., then narrowing and making a right angle with the hinder margin. Fields i. and ii. unarmed; iii. with two high median tubercles; iv., v., and dorsal free segments i. and ii. unarmed; dorsal free segment iii. with a very high median cone. Pedipalps shorter than the body; the femur with an apical inner spine. Legs stout and short. Tarsus i. with 5 joints; ii. ?, iii. ?, iv. with 6.

Male unknown.

Type.

*Meteusarcoides mutilatus*, sp. n.

♀.—7 mm.

Anterior margin of the cephalothorax with three small teeth over the base of chelicerae; anterior marginal field with two small spines; cephalothorax unevenly granular; eye-turret granular, with a small apical tubercle. Fields i.-iv. unevenly granular; field iii. with two median high tubercles; marginal lateral fields and v. with a granular row, as free dorsal segments i. and ii. Free dorsal segment iii. elevated in a stout median cone, unevenly granular. Stigmatic segment minutely granular; free ventral segments with two rows of granules. Hinder coxæ very granular. Femur i. with a stout inner apical spine; femur iv. with numerous short spines. Ventral surface and legs chestnut; dorsal scutum chestnut; the cephalothorax with a large white spot at each side of the eye-turret; field i. all white; field ii. with two lateral white spots.

*Hab.* Itatyaya. Coll. Carlos Moreira.

Type in the National Museum (Rio de Janeiro).

Genus *YPIRANGA*, nov.

Eye-turret closer to anterior margin than to first transverse groove, elevated, with a median blunt tubercle. Dorsal scutum with five transverse grooves, i. and ii. united by a longitudinal groove. Cephalothorax narrow; lateral margins of the abdominal scutum evenly rounded to groove iv. Fields i. and ii. of the dorsal scutum with two median low tubercles; field iii. with two high spines or tubercles; fields iv. and v. and dorsal segments i. and ii. unarmed; free dorsal segment iii. with a high median spine. Pedipalps shorter than the body, with the femur unarmed, without spines on the under face or on the apex. Legs stout; tarsi i., iii., and iv. with six joints, ii. with seven.

The male with processes and spines in the basal joints of the posterior legs.

Type.

*Ypiranga ypiranga*, sp. n.

♂.—5 mm.

Anterior margin of the cephalothorax with three median spines over the basal joint of chelicerae, the median stouter. Eye-turret granular, with a high median blunt tubercle; all the cephalothorax with minute granules.

unevenly scattered. Fields i. and iv. of the abdominal scutum minutely granular; fields i. and ii. with two median blunt tubercles; field iii. with two median spines a little curved with inner concavity; lateral fields and v. with a row of granules. Free dorsal segments i.-iii. with a row of granules, iii. also with a high median spine directed backwards. Coxa iv. granular, with an apical spur, directed obliquely backwards; trochanters with two spurs at the inner side. Femur a little bowed, with stout spines and a basal spur on the outer side. Body roast-yellow concolour; the legs with the apical third pitch-black.

*Hab.* Ypiranga (S. Paulo).

Type in the S. Paulo Museum.

Genus *DISCOCYRTUS*, Holmberg, 1878.

*Discocyrtus vestitus*, sp. n.

♂.—8 mm.

Anterior margin of the cephalothorax unarmed and smooth. Eye-turret closer to anterior margin than to first transverse groove, with two close high spines; cephalothorax unevenly granular and with two small median tubercles behind the eye-turret. Abdominal dorsal scutum with five transverse grooves, i.-ii. and iv.-v. united by longitudinal grooves in the median line. Fields i. and ii. unarmed and unevenly granular; iii. with scattered granules and with two high median spines; iv. with two rows of large granules; lateral fields with a marginal row of small tubercles and an inner row of minute granules. Field v. and free dorsal segments i.-iii. with two rows of granules. Coxa iv. granular, with an outer apical spur, curved at the apex and with a branch at its underside; trochanter with a short basal spur at its inner side and two apical spurs at its outer and inner side; femur strongly curved, with rows of stout spines. Femur of the pedipalps with an apical inner spine and a basal spine at its underside. All the underside olive-brown; dorsal scutum blackish brown-olive with the granules yellow; spines of field iii. black; the grooves of the dorsal scutum are white, and there are two white spots on the coxæ iv. near the scutum; chelicerae blackish, with olivaceous points; pedipalps brownish yellow. Coxæ i. and ii. pale yellow; the other segments much darker. Legs iv. chestnut with blackish spines with yellow tips.

*Hab.* Poço Grande (S. Paulo).

Type in the S. Paulo Museum.



## Subfam. GONYLEPTINÆ.

Genus PACHYLIBUNUS, Rocwer, 1913.

*Pachylibunus gomesianus*, sp. n.

♂.—12 mm.

Anterior margin of the cephalothorax almos. smooth, only with a small median tooth. Cephalothorax granular. Eye-turret closer to anterior margin than to first transverse groove, with a very high median sharp spine. Abdominal scutum with four transverse grooves, i.-ii. united by a median longitudinal groove. Marginal fields with a marginal row of tubercles and two rows of smaller granules, more unevenly disposed. Field i. with small granules unevenly scattered; ii. with two rows of granules a little larger than those of i.; i. and ii. unarmed, without spines or median tubercles; iii. with two median blunt low tubercles and small granules unevenly scattered; iv. and free dorsal segments i.-iii. with a tranverse row of granules, the medians a little larger and more apart than the others. Coxa iv. with a big apical spur, curved backwards and downwards and with a basal branch; trochanter with a large spur curved upwards and forwards, crossing the coxal spur. Femur almost right with a basal upper spur, another median and three outer apical. Femur of the pedipalps with an apical inner spine and two basal under spines. Tarsus i. with six joints; ii., iii., and iv. with more than six. All the body black, concolour.

*Hab.* Ouro Preto. Coll. Dr. Carlos de Magalhães Gomes.  
Type in my own collection.

## Genus PROGONYLEPTOIDES, nov.

Eye-turret much closer to anterior margin than to first transverse groove of the dorsal scutum, very low and without tubercles or spines. Dorsal scutum with four transverse grooves, i. and ii. united by a median longitudinal groove. Cephalothorax narrow; lateral margins of abdominal scutum evenly rounded as far as transverse groove iii., and forming a right angle with the hinder margin. Fields i. to iv. and free dorsal segments i. to iii. unarmed, without spines or median tubercles. Coxæ i.-iii. weak and parallel; coxa iv. twice longer and stouter than the others together. Chelicerae normal and equal in both sexes. Pedipalps shorter than the body; femur with spines at the underside, but without apical spine at the inner side. Legs short and stout; femur iv. curved, with

spines and teeth in the male. Tarsus i. with six joints, ii. to iv. with more than six; tarsi iii. and iv. with two spurs without teeth, and pseudonychium ever present, without scopula.

Type.

*Progonyleptes inermis*, sp. n.

♂.—10 mm.

Anterior margin of the cephalothorax smooth; the anterior field before the eye-turret with a little elevation, with two small tubercles. Eye-turret very low, smooth, without tubercles or spines. Fields i., ii., and iii. smooth, unarmed, without tubercles or spines; iv. and marginal fields with an even row of granules; free dorsal segments i., ii., and iii. with a row of small tubercles; anal dorsal plate smooth and unarmed. Coxa iv. with a large apical outer spur, directed sideways, bifid, the under branch larger than superior; femur iv. curved, with a basal upper spur and two strong apical spines. All the body chestnut concolour.

*Hab.* Alto da Serra (S. Paulo).

Type in the S. Paulo Museum.

Genus *ILHAIA*, Roewer, 1913.

*Ilhaia fluminensis*, sp. n.

♀.—7 mm.

Anterior margin of the cephalothorax with two small spines at lateral corners and with a median upper bifid tubercle. Eye-turret closer to anterior margin than to first transverse groove, with two small close spines. Abdominal scutum with four transverse grooves, i. and ii. united by a median longitudinal groove; fields i., ii., and iii. with two median blunt tubercles and with some granules unevenly scattered; marginal fields with a row of granules; field iv. and free dorsal segment i. with two low blunt median tubercles and a row of granules; free dorsal segments ii. and iii. with a row of granules and a small median cone; anal dorsal plate unevenly granular, as well as the stigmatic segment and the coxæ; free ventral segments with a row of granules. Pedipalps shorter than body; the femur without spines at the inner and under side. Tarsus i. with six joints; ii., iii., and iv. with more than six. Body concolour, from chestnut to black.

*Hab.* Pinheiro (Rio de Janeiro). Collected by myself.

Type in the S. Paulo Museum.

## Genus GONYLEPTES, Kirby, 1818.

*Gonyleptes longicornis*, sp. n.

♂.—10 mm.

Anterior margin of the cephalothorax smooth and without dorsal elevation. Eye-turret almost separated from the anterior margin and from first transverse groove; much elevated and with two high pit-harped spines, very close. Cephalothorax narrow, smooth, with two small, low, blunt median tubercles just behind the eye-turret. Abdominal scutum with four transverse grooves, i. and ii. united by a median longitudinal one; fields i. and ii. with two blunt median tubercles and one row of granules; field iii. with two high and stout median spines and two transverse rows of granules, close to transverse grooves iii. and iv.; marginal fields with one single row of granules or small tubercles. Field iv. and free dorsal segments unarmed, each with a row of large granules; anal dorsal plate minutely granular. Stigmatic segment and free ventral segments thickly granular, as well as coxæ iv. Coxa iv. with an apical outer spur long, slender, almost transverse, curved and sharp-tipped, without accessory branch; trochanter with a low spur at its upperside; femur right, with small spines at its outer side; two stout curved spines on the apical third at the inner side, and with a stout spine on the median third at its upperside. Pedipalps shorter than body; the femur with an apical spine. Tarsus i. with six joints, ii., iii., and iv. with more than six. All the body mahogany-brown with paler tubercles.

*Hab.* Alto da Serra (S. Paulo).

Type in the S. Paulo Museum.

*Gonyleptes saprophilus*, sp. n.

♂.—8 mm.

Anterior margin of the cephalothorax with six small spines, two at each lateral corner and two median; they are not dorsal anterior tubercles. Cephalothorax narrow, smooth, with two small tubercles behind the eye-turret. Eye-turret closer to anterior margin than to first transverse groove, with two small close spines. Dorsal scutum with four transverse grooves, i. and ii. united by a longitudinal one. Fields i. and ii. with two low median tubercles, unevenly granular; iii. with two high median tubercles and also unevenly granular; lateral fields with three rows of small granules and tubercles; iv. with two

transverse rows of very small tubercles. Free dorsal segments unarmed, with a row of granules; dorsal anal plate unevenly granular. Coxa iv. granular, with an apical outer spur, obliquely directed backwards; this spur is short, blunt, and without accessory branch. Trochanter iv. unarmed; femur right with stout spines. Pedipalps shorter than body, the femur with an apical inner spine. Ventral surface roast-yellow; the stigmatic segment bordered with black. Cephalothorax chestnut, with two large pale yellow spots; fields i. to iv. as the cephalothorax, the high spines on iii. olive-yellow; marginal fields dark olive-brown with tips of the tubercles yellowish. Pedipalps and legs olive-brown; posterior legs darker with the coxal spur blackish.

*Hab.* Itatyaya (Rio de Janeiro). Coll. Carlos Moreira.

Type in the National Museum.

#### Genus ACANTHOGONYLEPTES, nov.

Eye-turret closer to the anterior margin of the cephalothorax than to first transverse groove. Cephalothorax narrow, parallel-sided; lateral margins of the abdominal scutum evenly rounded to transverse groove iii., forming a right angle with the hinder margin. Dorsal scutum with four transverse grooves, i. and ii. united by longitudinal one. Fields i., ii., and iii. with two median tubercles; iv. and free dorsal segments i. and ii. unarmed; iii. with a median high cone. Pedipalps shorter than body; the femur with an apical inner spine. Tarsus i. with six joints, ii., iii., and iv. with more than six; coxæ i. to iii. short, slender, and parallel; iv. stouter and longer than the others together. Chelicerae weak and normal in both sexes. Posterior legs in male with spurs and stout spines. Tarsi iii. and iv. with apical claws without teeth and with pseudonychium.

Type.

#### *Acanthogonyleptes pulcher*, sp. n.

♂.—8 mm.

Anterior margin of the cephalothorax with three small spines at the lateral corners. Eye-turret much closer to anterior margin than to first transverse groove, very high, with two small close tubercles. Cephalothorax narrow and smooth. Fields i., ii., and iii. of the abdominal dorsal scutum with two median tubercles. The tubercles of ii. higher than of i., and those of iii. the highest; every field with scattered granules; field iv. and free dorsal segments i.

and ii. unarmed, with a transverse row of granules; free dorsal segment iii. with a small median cone and a transverse row of small tubercles; dorsal anal plate unevenly granular. Marginal fields of the dorsal scutum with many granules unevenly scattered. Coxa iv. granular and with the apical spur transverse, narrow, with a short branch at the under-side; trochanter with a basal outer spur, curved forwards, and with another inner apical spur; femur almost right with a bifid spur at the basal third of its upperside, and with stout sharp spines at the outer side. Pedipalps shorter than body; the femur with an apical inner spine. Tarsus i. with six joints and the others with more than six. Ventral surface roast-yellow; cephalothorax blackish, with two lateral white spots; field i. of the dorsal scutum with two white spots concealing the median black tubercles; field ii. with two small white spots close to the median tubercles; field iii. with two large white spots, each with a mahogany-brown tubercle and a small round black spot. Chelicerae olivaceous; pedipalps pale yellow and legs chestnut.

*Hab.* S. Sebastião Island and Alto da Serra (S. Paulo).

Type in the S. Paulo Museum.

Genus PARAGONYLEPTES, Roewer, 1913.

*Paragonyleptes alticola*, sp. n.

♂.—7 mm.

Anterior margin of the cephalothorax with two high median spines and two small ones at every lateral corner. Cephalothorax narrow, with a shallow pit behind the eye-turret, and minutely granular. Eye-turret closer to anterior margin than to first transverse groove and with two small close spines. Fields i., ii., and iii. with some large scattered granules, each with two median tubercles, those on i. very widely separated from each other; closer on ii.; very close and highest on iii. Lateral fields with a marginal row of small tubercles and some scattered granules; iv. with a transverse row of granules. Free dorsal segment i. with a median blunt tubercle and a transverse row of granules; free dorsal segments ii. and iii. with a stout median spine and a row of granules; dorsal anal plate unevenly granular. Free ventral segments i. to v. with a row of granules; stigmatic plate and coxæ iv. thickly granular. Coxa iv. with the inner spur almost obsolete and the outer spur single, sharp-tipped, with some upright bristles, directed backwards. Chelicerae dark olive with some minute yellow points; legs dusky black with yellow rings; legs iv. roast-yellow; the

spur of coxæ iv. black. Cephalothorax roast-yellow, unevenly spotted with white and with a white band on the anterior margin; abdominal dorsal scutum yellow, with black granules; free dorsal segments with narrow yellow bands with their granules and spines black, and with wide orange unarmed bands. Free ventral abdominal segments as dorsal; stigmatic plate and coxæ iv. roast-yellow, with black granules. Femur of pedipalps with an apical inner spine. Tarsus i. with six joints, ii. to iv. with more than six.

*Hab.* Retiro de Itatyaya (2200 m. high). Coll. Carlos Moreira.

Type in the National Museum.

*Paragonyleptes anomalus*, sp. n.

♂.—10 mm.

Anterior margin of cephalothorax with two small spines at its lateral corners and with a stouter elevation with two spines at the median line. Cephalothorax narrow, smooth, with only two small median tubercles behind the eye-turret. Eye-turret closer to anterior margin than to first transverse groove, granular and with two close small spines. Abdominal dorsal scutum with four transverse grooves, i. and ii. united by a longitudinal groove; field i. with two low tubercles and with some scattered granules; fields ii. and iii. with two median low tubercles and two transverse rows of granules, close to transverse grooves; lateral marginal fields with an outer row of small tubercles and an inner row of granules; field iv. and free dorsal segment i. unarmed, with a transverse row of stout granules; free dorsal segment ii. with a small median cone and a transverse row of granules; iii. with a stout median spur and unevenly granular; anal plate with a median process and two rows of granules. Coxa iv. with a small outer apical spur, directed backwards; trochanter with an apical inner spur, curved upwards; femur strongly curved, with a basal dorsal spine and with three strong spines at the apical inner third. Pedipalps shorter than body; femur with one apical spine at the inner side; the underside unarmed. Tarsus i. with six segments, ii., iii., and iv. with more than six. Body, legs, and pedipalps light yellow; cephalothorax a little violet; in the abdominal dorsal scutum a large violet V, whose tip is in the field i. and whose branches touch the lateral margins of the scutum a little behind the transverse groove i.

*Hab.* S. Sebastião Island (S. Paulo).

Type in the S. Paulo Museum.

*Paragonyleptes fulvigranulatus*, sp. n.

♂.—10 mm.

Anterior margin of cephalothorax with three close spines at its lateral corners and with two little median cones at its upperside. Cephalothorax narrow, unevenly granular. Eye-turret closer to anterior margin than to first transverse groove, very high and with two close sharp spines. Abdominal dorsal scutum with four transverse grooves, i. and ii. united by a median longitudinal groove. Fields i., ii., and iii. with two median blunt tubercles and unevenly granular; field iv. unarmed, with a transverse row of granules; marginal fields unevenly granular. Free dorsal segments i., ii., and iii. with a median cone and a transverse row of granules. Stigmatic plate and coxæ iv. with scattered granules; free ventral segments with a row of granules; coxæ iv. with a long outer spur, a little oblique downwards, with a curved tip and a short branch at the underside; femur right, with seriated spines at its inner and outer side and with a dorsal anvil-like spur. Underside roast-yellow, with the granules of coxæ iv. and of stigmatic plate dark fulvous. Dorsal scutum dark yellow with fulvous granules.

*Hab.* Alto da Serra (S. Paulo).

Type in the S. Paulo Museum.

*Paragonyleptes triacanthus*, sp. n.

♂.—8 mm.

Anterior margin of cephalothorax with three distinctly separated spines at its lateral corners and with a median trident-like process. Eye-turret nearly evenly separated from anterior margin and of first transverse groove, with two small cones close to eyes. Abdominal dorsal scutum with four transverse grooves, i. and ii. united by a median longitudinal one. Cephalothorax smooth. Fields i. and ii. with two small median low tubercles and unevenly granular; field iii. with two high blunt median cones and unevenly granular; marginal fields with a single row of granules. Field iv. and free dorsal segment i. unarmed, with a transverse row of granules; free dorsal segments ii. and iii. with a small median cone and a row of granules. Stigmatic plate with scattered granules. Coxa iv. with a long apical spur, curved at the apex and with a short hinder branch; trochanter with a short apical spur at its inner side; femur nearly right with a stout anvil-like

process at the upperside, a comb of spines at the outer side, and with long curved spines at the inner side. Pedipalps shorter than body; femur with an apical inner spine and unarmed at the underside. Tarsus i. with six joints ii., iii., and iv. with more than six. Underside yellow-brown, with scattered spots in the coxæ and with dusky granules. Cephalothorax dark yellow, with a large median mahogany-fulvous spot; dorsal scutum olive-brown, and little dusky spots around the granules. Chelicerae pitch-black; pedipalps and legs i. nearly black; legs ii., iii., and iv. chestnut; apical spur of coxa iv. black.

*Hab.* Poço Grande (S. Paulo).

Type in the S. Paulo Museum.

Genus GONYLEPTOIDES, Roewer, 1913.

*Gonyleptoides moreiræ*, sp. n.

♂.—7 mm.

Anterior margin of cephalothorax smooth, with two median small cones at its upperside. Eye-turret closer to anterior margin than to first transverse groove, very high and with two close spines. Cephalothorax narrow, with a row of granules around the eye-turret. Dorsal scutum with four transverse grooves, i. and ii. united by a longitudinal one. Fields i., ii., and iii. unevenly granular and with two median low blunt tubercles; marginal fields unevenly granular; field iv. and free dorsal segments unarmed, with a row of granules. Stigmatic plate smooth; coxa iv. granular, with a long, very oblique spur, with a short branch near its tip; trochanter with a spine at its upperside; femur right, with a basal spur and four stout spines at its inner side. Pedipalps as long as body; femur unarmed. Tarsi i., ii., iii., and iv. with more than six joints. Body roast-yellow, with the granules of dorsal scutum chestnut.

*Hab.* Retiro de de Itatyaya (2200 m. high). Coll. Carlos Moreira.

Type in the National Museum.

Genus PROGONIOSOMA, Roewer, 1913.

*Progoniosoma macrucanthum*, sp. n.

♂.—13 mm.

Anterior margin of cephalothorax smooth, without spines or dorsal elevations. Eye-turret very narrow, much closer to anterior margin than to first transverse



groove, with two small spines wide apart, close to eyes. Cephalothorax narrow, smooth. Dorsal scutum with four transverse grooves, i. and ii. united by a wide median longitudinal groove. Fields i. and ii. unarmed, smooth, without granules or tubercles; field iii. only with two median blunt tubercles; marginal fields with a single row of small tubercles; field iv. and free dorsal segments unarmed, with a row of granules; anal dorsal plate unevenly granular; stigmatic segment smooth. Coxa iv. nearly smooth, with a short, stout, curved apical spur at its outer side and with another at its inner side, nearly four times longer, sharp-tipped, nearly as long as the body; trochanter with a median outer spur; femur curved, granular, with an apical spine.

Underside dark roast-yellow, with a light border around the stigma. Dorsal scutum dark roast-yellow, spotted with chestnut. Legs chestnut and pedipalps dark yellow.

*Hab.* S. Paulo.

Type in the S. Paulo Museum.

Genus ACUTISOMA, Roewer, 1913.

*Acutisoma inscriptum*, sp. n.

♂.—10 mm.

Anterior margin of cephalothorax smooth. Eye-turret very narrow, with two high spines wide apart. Cephalothorax narrow, smooth. Dorsal scutum with four transverse grooves, i. and ii. united by two median longitudinal grooves. Field i. with two minute median tubercles, smooth; ii. unarmed and smooth without spines, tubercles, or granules; field iii. smooth, with two high and stout median spines; field iv. and free dorsal segments i., ii., and iii. with a transverse row of granules, without median spines or tubercles, but with a cone, directed sideways and backwards at the posterior lateral corners. Anal dorsal plate smooth. Marginal fields of the dorsal scutum with a row of small granules. Stigmatic segment smooth; coxa iv. smooth; i., ii., and iii. with a row of granules. Femur right. Tarsi i. to iv. with more than six articles. Pedipalps a little longer than body; femur with six spines (3 longer and 3 shorter) at its underside and with two strong apical spines at its inner side.

Underside roast-yellow, with a silvery border around the stigmatic openings. Dorsal scutum yellow-violet; anterior margin of the cephalothorax greenish, with a median silvery band; cephalothorax with lateral margins dusky, and with

a median white V-like spot; eye-turret light yellow. Grooves on the abdominal dorsal scutum white; at every side of the cephalothorax there are white spots and the marginal fields have a narrow white band; field iv. with a narrow transverse white band; dorsal free segments i. and ii. with two lateral white small spots. Legs iv. with femur chestnut and the other segments greenish; femora of legs i., ii., and iii. smaragdine-green, as also the chelicerae; pedipalps with trochanter light yellow and the other segments green.

*Hab.* S. Sebastião Island (S. Paulo).

Type in the S. Paulo Museum.

*Acutisoma monticola*, sp. n.

♂.—10 mm.

Anterior margin of cephalothorax smooth, only with a low median tubercle at its upperside. Eye-turret very narrow, closer to anterior margin than to transverse groove i., with two high close spines. Cephalothorax narrow, granular. Dorsal scutum with four transverse grooves, i. and ii. united by two divergent longitudinal grooves. Field i. with two small median tubercles and some large scattered granules; field ii. unarmed, without spines or tubercles, only with some scattered granules; iii. with two high median cones and few granules; iv. and free dorsal segments i., ii., and iii. with a row of granules without median tubercles or spines, but with two cones at the lateral corners, directed backwards and sideways; anal dorsal plate unarmed; marginal fields of the dorsal scutum with two rows of granules. Stigmatic segment smooth; ventral free segments with a row of granules; coxae i. to iii. with a row of tubercles; iv. thickly granular. Femur very long, right; all the tarsi with more than six joints. Pedipalps as long as the body; its femur with five spines at the underside and an apical strong spine at the inner side.

Underside chestnut; the tubercles of the coxae are dark yellow. Legs, chelicerae, and pedipalps chestnut, the pedipalps thickly spotted with olive-yellow. Cephalothorax fulvous-black, with a median white band behind the eye-turret, which is lighter; at every side there is a row of small silver-white spots. Dorsal scutum chestnut, with a median longitudinal white band, which is forked behind the spines of field iii., and has a short transverse branch close to grooves ii. and iii., white; marginal fields thickly spotted with white.

*Hab.* Campos do Jordão (S. Paulo).

Type in the S. Paulo Museum.

*Acutisoma proximum*, sp. n.

♂.—12 mm.

Anterior margin of cephalothorax smooth, without spines or tubercles. Eye-turret narrow, closer to anterior margin than to groove i., with two small tubercles close to eyes. Cephalothorax narrow, granular. Abdominal dorsal scutum with four transverse grooves, i. and ii. united by two divergent longitudinal grooves. Marginal fields with an outer row of small tubercles and an inner one of granules; fields i. and ii. unarmed, with scattered granules; iii. with two high median spines and scattered granules; field iv. and free dorsal segments i. to iii. with a row of granules and two divergent concs at their lateral corners; anal dorsal plate unarmed and unevenly granular. Stigmatic segment smooth; coxæ i. to iii. with a row of granules. Pedipalps as long as body; femur with three stout and four shorter spines at its underside, and with two sharp apical spines at its inner side. Legs very long; the femur of legs iv. with a row of stout spines at its inner side; coxæ iv. with the apical outer spur long, narrow, nearly transverse, with a short hinder branch; the apical inner spur short, forming a cone like those of the dorsal free segments of abdomen; trochanter with a median outer spur curved forwards, and another apical at its upperside curved backwards. All the tarsi with more than six joints.

Underside roast-yellow. Dorsal scutum olive-yellow, the anterior margin of cephalothorax dusky, and the tubercles of eye-turret light yellow; the cephalothorax has, behind the eye-turret, a wide white V. Transverse grooves white; scutum with a wide median white band bordered with narrow chestnut lines. Basal third of femur iv. blackish with a white spot; legs chestnut. Pedipalps smaragdine-green; chelicerae light green.

*Hab.* Alto da Serra (S. Paulo).

Type in the S. Paulo Museum.

## Subfam. MITOBATINÆ.

Genus NEOMITOBATES, Roewer, 1913.

*Neomitobates ornatus*, sp. n.

♂.—6 mm.

Anterior margin of cephalothorax smooth, without spines or tubercles. Eye-turret closer to anterior margin than to transverse groove i., granular, and with two high close spines. Cephalothorax narrow, with a median granular

area behind eye-turret. Dorsal scutum with four transverse grooves, i. and ii. united by a longitudinal median groove. Field i. with a median, very thickly granular area and a transverse row of small granules close to groove ii.; field ii. unevenly granular; field iii. with two median, very high, sharp spines bordered with little granules and with two transverse rows of spines close to transverse grooves iii. and iv.; field iv. with two low median cones and a transverse row of granules; marginal fields with two rows of granules. Free dorsal segments i. to iii. unarmed, with a row of granules; anal dorsal plate unevenly granular. Outer apical spur of coxa iv. very curved, with a short branch at its underside; trochanter with a short apical outer spur, curved forwards; femora very long and slender. Tarsus i. with six joints, ii., iii., and iv. with more than six. Pedipalps as long as body; its femur unarmed.

♀.—5 mm.

Very similar to male, but the femur much shorter (femur iv. 12 mm. in female and 45 mm. in male), and with the spines of field iv. very high. Colour the same in both sexes. Dorsal scutum brownish black; cephalothorax with a wide median olive-yellow band; spines of eye-turret light yellow; granules of cephalothorax and abdominal scutum light yellow; transverse grooves white; in field iii. there is a little white, T-like groove behind the median blackish spines; field iv. light yellow. Legs chestnut.

*Hab.* Poço Grande, Alto da Serra and Franca (S. Paulo).

Type in the S. Paulo Museum.

#### Genus *ANCISTROTUS*, Koch, 1839.

*Ancistrotus nigricans*, sp. n.

♂.—5 mm.

Anterior margin of cephalothorax with two or three little spines at its lateral corners and with a median thickly granular elevation at its upperside. Eye-turret closer to anterior margin than to transverse groove i., smooth, with two high close spines. Cephalothorax smooth. Abdominal dorsal scutum with four transverse grooves, ii. and i. united by a longitudinal groove. Field i. with two median, low, blunt tubercles and some scattered granules; ii. with a transverse row of minute tubercles; iii. with two high median spines, bordered by a single row of granules; iv. unarmed, with two rows of granules; marginal fields with a single row of granules. Pedipalps as long as body; the femur with an apical inner spine and underside unarmed.

Tarsus i. with six joints, ii., iii., and iv. with more than six. Tarsi iii. and iv. with two untoothed claws and with pseudonychium, without scopula.

Underside roast-yellow. Dorsal scutum chestnut, blackish, with eye-turret spines lighter; spines of field iii. black, as the posterior border of field iii. Pedipalps yellow; legs chestnut.

*Hab.* Campos do Jordão (S. Paulo).

Type in the S. Paulo Museum.

### Subfam. CÆLOPYGINÆ.

Genus CÆLOPYGUS, Koch, 1839.

*Cælopygus leucopheus*, sp. n.

♂.—8 mm.

Anterior margin of cephalothorax with two short spines at its lateral corners and with two small median cones at its upperside. Eye-turret closer to anterior margin than to transverse groove i., low, with two close small cones. Cephalothorax narrow, with scattered granules. Abdominal scutum much enlarged, wider than long, with four transverse grooves, i. and ii. united by a longitudinal groove. Fields i. and ii. with two median low tubercles and some scattered granules; iii. with two high median spines and more granular than i. or ii.; iv. and free dorsal segments i. to iii. unarmed, with a transverse row of granules; marginal fields with two rows of small tubercles and some granules scattered in the posterior third. Dorsal anal plate smooth. Stigmatic segment and underside of coxæ iv. thickly granular. Outer apical spur of coxa iv. transverse, long, curved, in a spiral line; trochanter iv. with a median outer spur directed outwards and forwards; femur right, with a row of curved stout spines at its inner side, and a row of shorter spines at the basal third of its upperside. Pedipalps a little longer than body, with slender unarmed femur. All the tarsi with more than six segments; the basal joints normal, not widened. Tarsi iii. and iv. with two dentated claws, with a pseudonychium, without scopula.

Cephalothorax and dorsal abdominal scutum whitish; marginal fields light yellow. On fields i. and ii. the tubercles are in brown spots and the granules of field of dorsal scutum are also brown; the median spines of field iii. light yellow, with fulvous tips; field iv. blackish; dorsal anal plate with

two large triangular white spots, bordered with black; stigmatic segment and coxæ olive-yellow, with black granules; apical outer spur of coxa iv. black. Legs i. to iii., pedipalps, and chelicerae light yellow; femur iv. chestnut.

*Hab.* Poço Grande (S. Paulo).

Type in the S. Paulo Museum.

#### Genus LIARTHRODES, nov.

Eye-turret closer to anterior margin of cephalothorax than to transverse groove i., with two close low tubercles. Cephalothorax narrow; lateral margins of the abdominal dorsal scutum very wide as far as groove iii., and forming with the under border two prominent angles. Dorsal scutum with four transverse grooves, i. and ii. united by a longitudinal one. Fields i. to iv. and free dorsal abdominal segments armed, without tubercles or spines. Coxæ i. to iii. narrow, slender, and parallel; coxa iv. wide, longer and stouter than the others together. Chelicerae short, normal in both sexes. Pedipalps as long as body; femur with an apical inner spine, its underside unarmed. Legs long and slender, with right femur. Basal segments of legs iv., in male, with spines and spurs. Tarsi i. to iv. with more than six joints; basal joints of tarsus i. not widened in male; tarsi iii. and iv. without scopula, with pseudonychium and two dentated claws.

Type.

#### *Liarthrodes tetramaculatus*, sp. n.

♂.—8 mm.

Anterior margin of cephalothorax with two stout median tubercles. Cephalothorax narrow and smooth. Eye-turret low, a little closer to anterior margin than to transverse groove i., with two small close tubercles. Abdominal dorsal scutum with four transverse grooves, i. and ii. united by a longitudinal groove. Fields i. to iv. and free dorsal segments i. to iii. unarmed, each with a transverse row of granules; marginal fields with a row of small granules. Underside smooth. Outer apical spur of coxa iv. directed downwards and sideways, curved in a wide spiral. Tarsi i. to iv. with more than six segments. Pedipalps as long as body; femur with an inner apical spine; underside unarmed.

Cephalothorax dark brown, with a narrow long whitish spot on each side; fields i. and ii. of the abdominal dorsal scutum with a small white spot at their posterior corners; field iii. blackish; field iv. and dorsal free segments dark

brown; anal dorsal plate with a large transverse white spot; anal ventral plate with two lateral spots. Chelicerae, pedipalps, and legs olive-brown; the apical spur of coxa iv. black. Underside yellow; dorsal scutum olive-yellow.

*Hab* Petropolis (Rio de Janeiro). Coll. Altino de Azevedo Sodré

Type in S. Paulo Museum.

Genus METARTHRODES, Roewer, 1913.

*Metarthrodes farinosus*, sp. n.

♂ —8 mm.

Anterior margin of cephalothorax smooth, with two minute median tubercles. Cephalothorax narrow, unevenly granular. Eye-turret closer to anterior margin of cephalothorax than to transverse groove 1., with two low spines wide apart. Dorsal scutum with four transverse grooves, 1. and 2. united by a longitudinal groove. Fields 1. and 2. with two median blunt tubercles and some scattered granules; the tubercles of 1. sharper and stronger than those of 2. Field 3. with two high median spines and hardly granular; 4. and free dorsal segments unarmed, with a transverse row of granules; anal dorsal plate with two rows of granules. Stigmatic segment hardly granular, free ventral segments with a row of granules. Pedipalps as long as body; femur unarmed, without apical inner spine. Legs long and slender. Tarsi 1. to iv. with more than six segments; <sup>20.4</sup> and iv. with two dentated claws.

Body nice roast-yellow; cephalothorax and dorsal scutum of abdomen thickly pointed with white; in field 3. there are two white spots bordered with black close to under coxae, tubercles of 1. and 2. and spines of 3. black; field 4. with a row of six narrow transverse white spots. Free dorsal segments olive-yellow, with a narrow transverse posterior white band; anal plates olive-brown, thickly pointed with white. Chelicera and pedipalps nearly black, with minute olive spots. Legs 1. and 2. brownish black.

*Hab*. Alto da Serra (St. Paulo).

Type in the S. Paulo Museum.

Genus SODREANA, nov.

Eye-turret closer to anterior margin than to transverse groove 1., with two high spines. Cephalothorax narrow, lateral margins of dorsal scutum evenly rounded as far as transverse groove 3. and forming two prominent angles

with posterior border of dorsal scutum. Dorsal scutum with four transverse grooves; i. and ii. united by a longitudinal groove. Fields i. and ii. with two median, blunt, low tubercles; field iii. with a high median cone; iv. and free dorsal segments unarmed, without spines or tubercles. Chelicerae short, normal in both sexes. Pedipalps longer than body; femur slender, unarmed, without apical spine. Coxae i. to iii. slender and parallel; iv. longer and thicker than the others together. Tarsus i. with six joints, ii. to iv. with more than six. Male with spurs and spines in the basal segments of legs iv. Tarsi iii. and iv. without scopula, with pseudonychium, and with two dentated claws. Basal joints of tarsus i., in male, normal, not swollen.

Type.

*Sodreana sodreana*, sp. n.

♂.—8 mm.

Anterior margin of cephalothorax with an even row of minute spines, without dorsal elevation. Eye-turret closer to anterior margin than to transverse groove i., with two high divergent spines. Cephalothorax unevenly granular. Abdominal scutum with four transverse grooves, i. and ii. united by a longitudinal one. Fields i. and ii. with two median, low, blunt tubercles and unevenly granular; iii. with a median, stout, thickly granular tubercle, and with scattered large granules; marginal fields unevenly granular; iv. and dorsal segments unarmed, each with a row of granules. Stigmatic segment smooth. Pedipalps longer than body; femur unarmed. Tarsus i. with six joints, ii. to iv. with more than six. Coxa iv. with an outer apical spur, directed obliquely backwards and with a short branch at its underside; trochanter with a short spur at its outer side, curved sideways; femur curved, with a spine-like spur at the basal third of its upperside, and with high spines at its inner side. Cephalothorax dark brown; dorsal scutum brownish yellow; underside roast-yellow; apical spur of coxa iv. black.

*Hab.* Petropolis (Rio de Janeiro). Coll. Altino de Azevedo Sodré.

Type in the S. Paulo Museum.

Rio de Janeiro,  
November 1921.



XLIII. — *Descriptions de Variétés, Espèces et Genres nouveaux appartenant à la Famille des Coccinellides.*  
Par le Dr. SICARD, Médecin-Principal de l'armée.

MONSIEUR LE DR. GUY A. K. MARSHALL, Directeur de l' "Imperial Bureau of Entomology" au British Museum, m'ayant communiqué, pour détermination, quelques Coccinellides, grands destructeurs de Pucerons et de Cochenilles, intéressants par suite au point de vue de l'Entomologie économique, je donne ci-dessous la description des espèces nouvelles que j'ai trouvées dans cet envoi, dont la plupart des individus proviennent de la Jamaïque et de Porto-Rico.

*Epilachna bimaculicollis*, sp. n.

Subrotundata, ochraceo-flava, pube grisea sat dense vestita. Thorace bimaculato. Elytris maculis novem (4.4.1 positis) notatis. Laminæ abdominales extus apertæ; pedibus concoloribus.

Suborbiculaire et d'un jaune d'ocre grisâtre en dessus, avec une pubescence de même couleur, assez dense et longue, sans masquer la couleur foncière. Tête, palpes et antennes concolores. Corselet marqué de 2 taches noires oblongues situées vers les deux cinquièmes de la base, un peu obliques en avant et en dedans, avancées à peu près jusqu'au milieu de la hauteur. Ecusson concolore. Elytres en courbe rentrante à la base, qui est de même largeur que celle du corselet, élargis et régulièrement arrondis des épaules à l'angle apical, ayant vers le milieu leur plus grande largeur, à tranche obsolette, à ponctuation fine et peu inégale, à pubescence grisâtre assez longue et moyennement dense, à calus huméral peu marqué avec les épipleures d'un jaune plus claire marquées vers le milieu de leur bord externe d'une tache noire; d'un jaune d'ocre grisâtre avec 9 taches noires, dont 8 disposées en deux rangées transversales irrégulières situées respectivement au quart et aux trois cinquièmes de la longueur des élytres: tache 1 en arrière et en dehors du calus, éloignée du bord externe d'une distance égale à son propre diamètre, 2 sur le calus, arrondie, 3 en dedans de 2, sur le même ligne transversale, de même forme et un peu plus grosse, 4 en arrière et en dedans, sur la même ligne transversale que 1 et très près de la suture vers le quart antérieur de la longueur. Ces 4 taches, dont l'externe est la plus grosse, formant ainsi une bande arquée à convexité

antérieure; la 2<sup>e</sup> rangée, formée des taches 5, 6, 7 et 8, est anguleuse en avant, la tache 7 formant le sommet de l'angle; 5 en forme de courte band transversale, couvrant le bord externe (c'est cette tache dont la partie externe marque de noir l'épipleur), 6 et 7 triangulaires, et contiguës, sur le disque avec la partie antérieure de la tache 7 un peu plus avancée, tache 8 juxtasuturale, un peu plus postérieure aux deux tiers de la longueur; 9 grosse, transversale, n'atteignant ni la suture ni le bord externe, aux cinq sixièmes de la longueur. Une ligne droite tirée du calus à l'angle sutural passerait par les lignes 2, 6 et 9.

Dessous jaune ainsi que les pieds. Plaques abdominales sinuées à leur partie interne, couvrant environ les deux tiers longitudinaux du premier arceau ventral, ouvertes extérieurement.

Ongles bifides, à dent interne plus courte et avec une plantule formant une 2<sup>e</sup> dent.

Long. 5-6 mm.

NATAL: Durban, 19. xi. 1918, feeding on *Chilianthus arboreus*.

Cette espèce a une certaine analogie de dessin avec la *S. paykulli*, Muls., dont elle diffère, outre les caractères tirés des ongles, par ses élytres plus régulièrement arrondis, ayant leur plus grande largeur au milieu et non en avant du milieu, par la grosseur des taches qui sont maculaires et non ponctiformes, par leur disposition, la dernière rangée comprenant une seule tache et non deux, et par les 2 taches noires du prothorax.

*Epizachna parryi*, abb. nn.

Réseau noir des élytres largement interrompu, ne laissant subsister que quelques linéoles noires sur le fond jaune—en général, un point sur le calus, un second sur le disque au dessous et en dedans du premier, au quart de la longueur; deux traits noirs transversaux (l'externe très court) vers le milieu de la longueur de l'élytre, enfin un trait plus large, en forme d'accent circonflexe aplati vers les trois quarts de la longueur (ab. *degenerata*)—parfois le trait noir du milieu des élytres a également disparu et il ne reste de noir que les lignes de la partie antérieure et le trait accentiforme de la partie postérieure (ab. *pauperrima*).

KENYA COLONY: Kericho, iii. 1920 (*F. W. Dry*).

*Eiochomus jamaicensis*, sp. n.

Breviter ovalis, modice convexus, nitidus, supra niger, elytris  
 crassius (sutura anguste nigra), macula suturali rotundata  
 antica, inconspicua postice, nigris signata. Subtus niger, epimeris,  
 episternis meso- et metasterni abdominisque (segmento primo  
 excepto) rufis, pedibus nigris.

Brièvement ovale, brillant, médiocrement convexe. Tête,  
 palpes et antennes noirs. Corselet en ogive à la base avec  
 les angles postérieurs arrondis, fortement échancré à sa  
 partie antérieure, d'un noir profond avec les angles an-  
 térieurs étroitement jaunâtres, finement et assez densément  
 pointillé. Elytres un peu plus larges que le corselet à la  
 base, en ovale régulier jusqu'à l'extrémité qui est acuminée,  
 non aplatis sur les bords qui sont verticaux, environ deux  
 fois aussi longs que larges, à ponctuation très fine et très  
 superficielle, noirs avec trois grosses taches d'un rouge  
 cerise: tache 1 couvrant la base depuis l'écusson jusqu'au  
 tiers du bord latéral, formant un arc dont la partie interne  
 serait échancrée en arc de cercle et la partie postérieure en  
 angle presque droit; tache 2 grosse, oblongue, discale, lais-  
 sant la suture étroitement noire et étendue en dehors  
 jusqu'au milieu de la longueur de l'élytre, dont elle couvre  
 du tiers aux trois cinquièmes de la longueur, plus ou moins  
 unie à l'angle postéro-interne de la tache 1 par sa partie  
 antéro-externe; tache 3 apicale en demi-cercle au bord latéral,  
 laissant sur la suture une bande noire rétrécie à l'extrémité  
 et couvrant le quart postérieur du bord latéral.

Ces taches laissent sur les deux cinquièmes antérieurs des  
 élytres une macule noire arrondie ou rhomboidale couvrant  
 le tiers médiane de leur largeur reliée par une étroite bande  
 suturale noire à un dessin en forme d'arc dont les branches  
 toucheraient le milieu du bord latéral par leur partie convexe.  
 Epipleures rouges, étroitement rembrunies en dehors à partir  
 du milieu jusqu'à l'extrémité.

Dessous noir sur l'antépectus, ainsi que sur le meso- et le  
 metasternum, dont les épimères et les épisternes restent pâles.  
 Ventre d'un jaune roux avec le premier segment noir et une  
 tache brune sur le dernier.

Pieds entièrement noirs

Long. 1 mm.

Il est probable que je n'ai eu entre les mains que des ♀.  
 Cette espèce se distingue par le dessin des élytres de  
 l'*Ex. cubensis*, Dim, qui en est voisin et dont il diffère en

ontre par son aspect brillant, sa couleur d'un noir profond et non bleu ardoisé, par sa forme plus allongée et sa taille plus petite.

LA JAMAÏQUE: sur les pruniers infestés de *Pulvinaria cupanæ*, dont il doit se nourrir ainsi que sa larve (*A. H. Ritchie*); Hope, 25. ix. 1920 (*C. C. Gowley*).

*Exochomus ritchiei*, sp. n.

Rotundatus, convexus, nitidus, supra luteus, thorace nigro, angulis anticis late (♂) vel anguste (♀) luteis. Elytris luteis maculis sex (1. 1/2. 1. 1/2 positis) ornatis; subtus brunneo-rufus, pedibus concoloribus.

Arrondi, luisant, convexe, à bord élytral très étroit; d'un jaune clair en dessus, brunâtre en dessous, avec le corselet en grande partie et six taches (dont deux communes) sur les élytres, noirs. Tête jaune avec un bandeau noir postérieur (♂) ou entièrement noire (♀), antennes rousses et palpes bruns. Corselet en ogive large à la base avec les angles postérieurs obtus mais bien marqués, finement rebordé sur les côtés, à ponctuation fine, superficielle et peu dense, paraissant entourée, à un fort grossissement d'un pointillé extrêmement fin; noir avec les angles antérieurs largement d'un blanc jaunâtre, cette couleur n'atteignant pas la base (♂) ou étroitement bordés de flave (♀). Elytres d'un jaune de paille marqués ensemble de six taches noires dont deux suturales. La première tache commune en ovale transversal, étendue du sixième au tiers de la longueur sur la suture, couvrant à peu près en largeur le sixième des élytres; la deuxième apicale en demi-cercle; sur chaque élytre une tache irrégulièrement arrondie, touchant le calus par sa partie antérieure et une seconde plus grosse, transversalement ovale, couvrant les trois quarts de la largeur et des trois aux quatre cinquièmes de la longueur. Dessous brunâtre avec les pieds de même couleur.

Long. 3.5 mm.

LA JAMAÏQUE (*A. H. Ritchie*).

Extrêmement voisin de l'*Ex. jordani*, Cr., du Brésil, par la couleur et la ponctuation. Il en diffère par sa taille un peu plus petite, la couleur du prothorax qui est plus largement noir, la forme de la tache suturale antérieure qui est en ovale transversal et non carrée, et par la présence d'une tache apicale assez grosse. Dans *Ex. ritchiei* la tache antérieure des élytres est moitié plus petite que la postérieure, tandis qu'elles sont subégales chez *jordani*. Enfin chez ce dernier le ♂ a la tête noire avec le labre et le canthus

roux et le corselet noir avec un étroit liseré antérieur et une large bordure latérale jaune, tandis que chez *ritchiei* le ♂ a la tête jaune avec une bande noire postérieure et seulement les angles antérieurs du corselet pâles. Le dessous est brun noir, tandis qu'il est d'un jaune clair chez *Ex. jordanii*.

*Scymnus fijiensis*, sp. n.

Oblongo-ovatus, parum convexus, pube grisea vestitus. Capite rufo, thoracis elytrisque nigro-brunneis, macula elytrorum, limboque apicali angusto flavis, ornatus; subtus piceo-brunneus; pedibus omnino rufis.

En ovale oblong, très peu convexe, d'un noir brunâtre passant au brun de poix en dessous, à pubescence grisâtre courte et assez clairsemée, à ponctuation grosse et assez dense. Tête grosse, d'un roux brunâtre avec le labre plus clair et les antennes et les palpes d'un jaune roux vif. Corselet en arc de cercle large à la base, sinué au devant de l'écusson, droit sur les côtés qui sont légèrement convergents en avant, échancré au bord antérieur avec les angles antérieurs arrondis, recouvrant la tête jusqu'au niveau du milieu des yeux, d'un brun noir foncé, légèrement plus clair le long du bord antérieur, à pubescence grisâtre un peu plus serrée que sur les élytres; ceux-ci de la largeur du corselet à la base, avec les angles huméraux bien marqués; régulièrement ovalaires jusqu'à l'extrémité, présentant vers le tiers antérieure leur plus grande largeur, avec un calus huméral très peu marqué, d'un brun noir foncé avec le bord apical étroitement roux et sur chacun une tache arrondie d'un jaune de paille couvrant les trois quarts de la largeur et des deux aux quatre cinquièmes de la longueur. Epipleures étroites, d'un noir brun, concaves à la base, prolongées jusqu'au niveau de la courbure postérieure des élytres.

Dessous brun de poix: prosternum aplati, assez large, muni de chaque côté d'un petit rebord élevé qui s'atténue en avant sans rejoindre celui du côté opposé, assez fortement et densément ponctué sauf entre les deux carènes où les points sont plus clairsemés; méso-sternum transversal, rugueusement ponctué, coupé droit en avant et en arrière; métasternum convexe, à peu près lisse au milieu avec une grosse ponctuation latérale.

Abdomen d'un brun de poix plus clair à l'extrémité. Plaques abdominales grandes en arc de cercle régulier atteignant le bord postérieur du segment, la ligne abdominale se dirigeant un peu en dedans de l'angle externe et effacée tout près du bord antérieur du segment.

Pieds entièrement roux.

Long. 2 mm.

I. FIDJI : Cuvu, 9. vii. 1915 (R. Veitch) ; Lautoka, 16. ii. 1920 (H. Greenwood).

A part son corselet noir et non jaune, cette espèce rappelle les *Pullus hareja*, Lew., et *alluandi*, Sic., par son dessin élytral, mais elle est de couleurs moins tranchées, le noir tirant sur le brun et les parties jaunes étant plus sombres. Elle en diffère aussi par sa forme aplatie et ovale. Elle aurait plutôt l'aspect du *Scymnus levaillanti*, Muls., dont la distinguent, outre ses caractères génériques, sa forme moins allongée et sa pubescence plus clairsemée et beaucoup plus courte.

*Scymnillus variipennis*, sp. n.

Breviter oratus, convexus, nitidus ; supra rufus, elytris basi nigricantibus, subtus rufescens ; antennis, palpis pedibusque flavis. Oculis nigris.

En ovale court, convexe, luisant, entièrement d'un jaune roux en dessus avec la base des élytres étroitement noirâtre, d'un roux un peu plus pâle et plus mat en dessous avec les antennes, les palpes et les pieds d'un jaune flave.

Tête jaune couverte d'une pubescence grisâtre courte, avec les palpes et les antennes d'un jaune de paille et les yeux noirs. Corselet en ogive large à la base, rétréci d'arrière en avant, avec les côtés rectilignes et les angles antérieurs aigus et très finement rebordés, échancré au bord antérieur en arc de cercle large ; ponctuation égale, extrêmement fine. Elytres plus larges que le corselet à la base, arrondis régulièrement sur les côtés, convexes, finement rebordés, à ponctuation plus grosse et plus inégale que celle du corselet avec quelques rares soies dressées visibles à un fort grossissement ; d'un roux un peu plus foncé que le corselet avec une étroite bande antérieure d'un noir brunâtre, entourant l'écusson qui reste de la couleur foncière, et se fondant insensiblement en arrière avec la couleur du reste des élytres, sans atteindre le bord latéral ; suture d'un roux étroitement plus foncé.

Dessous d'un jaune roux un peu plus clair sur l'abdomen à partir de la moitié postérieure du premier segment abdominal. Plaques abdominales ouvertes en dehors, la ligne abdominale se dirigeant vers l'angle postéro-externe du segment. Pieds d'un jaune flave.

Long. 1.5 mm.

PORTO-RICO : Rio Piedras, se nourrissant de l'*Aspidiotus destructor*, 18. x. 1921 (G. N. Wolcott).

*Scymnillus nunenmacheri*, sp. n.

Subrotundatus, convexus, nitidus; supra nigro-piceus, thoracis lateribus luteis; subtus brunneo-piceus, antennis, palpis pedibusque rufo-flavis.

En ovale très courte, convexe, d'un noir de poix en dessus avec la tête et les côtés du corselet (largement ♂, étroitement ♀) d'un jaune assez clair et les antennes, les palpes et les pieds d'un jaune flave.

Tête d'un jaune clair, presque glabre, avec un épistome très court et le labre roux, assez long, arrondi en avant; antennes et palpes d'un jaune de paille. Corselet d'un brun de poix foncé sur le disque avec les côtés jaunâtres, cette couleur fondue en dedans avec celle du disque, formant une étroite bordure antérieure et une bordure latérale tantôt étendue sur le tiers externe du bord antérieure et prolongée jusqu'à la base en se rétrécissant légèrement (? ♂) ou seulement à compter de la partie externe des yeux en avant en bande triangulaire assez étroite (? ♀); côtés droits, légèrement convergents, bord antérieur échancré en trapèze assez profondément; ponctuation extrêmement fine et superficielle.

Elytres d'un noir de poix, plus foncés que le corselet, régulièrement arrondis, convexes, plus fortement et plus profondément ponctués. Epipleures étroites, concaves, prolongées jusqu'à la corbure postérieure des élytres.

Dessous jaune sur l'antépéctus, d'un brun de poix uniforme sur le reste; méso- et métasternum fortement ponctués dans leur partie médiane. Plaques abdominales ouvertes en dehors; ligne abdominale en segment de cercle atteignant presque le bord postérieur du segment, dirigée vers l'angle postéro-externe, délimitant une plaque abdominale entièrement lisse, le reste de l'abdomen étant assez densément ponctué.

Pieds d'un jaune de paille.

Long. 1.2-1.5 mm.

PORTO-RICO: Rio Piedras, vit aux dépens de l'*Aspidiotus destructor*, 18. x. 1921 (G. N. Wolcott).

## SCYMNILLODES, gen. nov.

Ce genre comprend des insectes de très petite taille, à couleurs métalliques, rappelant pour la forme générale le genre *Æneis*. Son habitat semble limité jusqu'ici aux Grandes Antilles.

Arrondi, très convexe, glabre, de couleur métallique en dessus. Tête assez grosse, verticale ou même faiblement

inclinée d'avant en arrière. Epistome court, coupé transversalement au milieu avec une petite dent à chaque extrémité, labre au moins aussi long que l'épistome, arrondi à son bord antérieur. Yeux gros, arrondis, à leur bord interne dans leur moitié supérieure, échancrés fortement dans leur moitié inférieure. Antennes insérées tout contre les yeux, aussi longues que la largeur du front, paraissant formées de huit articles : article 1 gros, renflé ; 2 de la même grosseur que 1, mais beaucoup plus court ; 3, 4 et 5 plus grêles, presque aussi larges que longs ; 6, 7 et 8 plus épais et plus longs, surtout le dernier, formant une massue assez peu distincte et fusiforme. Palpes maxillaires à dernier article obliquement et faiblement sécuriforme.

Prothorax en ogive très large à la base, sinué de chaque côté de l'écusson, non rebordé ; rétréci en avant et à côtés fortement convergents, droits, non ou à peine échancré à sa partie antérieure, muni aux angles antérieure de quelques soies raides.

Écusson triangulaire, plus long que large.

Elytres plus longs que le corselet à la base, très convexes, à angle huméral arrondi, munis d'un fin rebord, moins de deux fois aussi longs que larges, à calus huméral bien marqué ; épipleures étroites, dépassant légèrement la courbure postérieure des élytres.

Prosternum large, en trapèze, sans carène, en arc de cercle très large antérieurement, coupé droit à sa partie postérieure. Mésosternum carré, en ligne droite en avant et en arrière, métasternum transversal, non sillonné. Abdomen de cinq arceaux, le premier égal aux trois suivants ; et le dernier au moins aux deux précédents réunis. Ligne fémorale en segment de cercle très large et régulière, rebordée, dirigée vers l'angle postéro-externe du segment.

Pattes robustes, fémurs sillonnés pour recevoir le tibia, qui est en arête tranchante en dedans ; tarses gros, à deuxième article profondément bilobé, ongles simples.

Ce genre a l'aspect des genres *Delphastus* et *Scymnillus*. Il diffère du premier par ses palpes maxillaires sécuriformes et l'absence de fossettes à la partie inférieure du corps, du second par ses yeux arrondis et non droits en dedans, sa face supérieure entièrement glabre, son premier segment abdominal plus court que tous les suivants réunis.

La couleur métallique des espèces jusqu'ici connues, assez rare dans la famille des Coccinellides, le rend aisément reconnaissable.



*Scymnillodes viridimicans*, sp. n.

Rotundatus, convexus, lacte viridis, capite, margine antico laterali prothoracis rufis; subtus niger, rufo variegatus; pedibus flavis.

Arrondi ou en ovale très court, convexe. Dessus d'un vert brillant, à ponctuation fine et bien marquée, avec la partie antérieure de la tête ainsi que les bords antérieurs et latéraux du corselet très étroitement jaunes. Tête à pubescence longue, jaunâtre, labre roux deux fois aussi long que l'épistome. Palpes et antennes d'un jaune flave. Dessous flave sur l'antépectus, d'un roux brunâtre sur le mésosternum et sur le prolongement intercoxal du premier arceau ventral, plus clair sur l'abdomen à partir du deuxième arceau, noir sur tout le reste.

Ponctuation grosse, clairsemée, plus éparsée sur le métasternum, plus serrée au contraire sur le mésosternum.

Pieds entièrement d'un jaune flave pâle.

Long. 1.3 mm.

LA JAMAÏQUE: Hope Gardens, sur les pousses de noisetier de St. Domingue (*Omphalia triandra*, Lin.) infestées de cochenilles, xii. 1920 (*A. H. Ritchie*).

*Scymnillodes cyanescens*, sp. n.

Subrotundus, convexus, nitidus, supra cyaneus; antennis flavis, palpis rufis; subtus nigro-brunneus; pedibus rufis.

Subarrondi, convexe, glabre et d'un bleu d'acier en dessus. Tête d'un vert métallique clair, couverte d'une pubescence grisâtre. Palpes roux, avec antennes plus claires. Corselet bleu, avec les angles antérieurs étroitement roux portant quelques poils courts, raides et grisâtres, à ponctuation fine et dense, ainsi que celle de la tête, à côtés assez faiblement convergents. Elytres d'un bleu d'acier, régulièrement convexes, à ponctuation un peu plus forte que celle du corselet. Dessous d'un brun foncé, avec les pieds roux. Dernier arceau ventral bombé, plus long que les deux précédents réunis.

Long. 1.5 mm.

LA JAMAÏQUE: sur les citronniers infestés par l'*Aleurocanthus woglumi* (*A. H. Ritchie*).

Distinct du précédent, dont je ne crois qu'il soit la ♀ par sa couleur bleue et non verte, sa taille un peu plus grande, la couleur des pieds (roux et non flaves), la bordure prothoracique limitée aux angles antérieurs, la teinte du dessous plus uniforme et moins foncée sur les parties noires, par son labre plus court et le dernier arceau de l'abdomen plus long. L'habitat est également différent.

? Var. *violaceus*, nov.

Elytris violaceo-micantibus. Prothorace angustiore.

PORTO-RICO. Rio Piedras, se nourrissant de l'*Aspidiotus destructor*, 18. x. 1921 (G. N. Wolcott).

*Scymnillodes æneus*, sp. n.

Breviter ovatus, convexus, nitens. Capito viridi, thoracis disco elytrisque aeneo-micantibus; palpis rufis, antennis dilutioribus; subtus rufo-brunneus; pedibus rufis.

D'un bronzé brillant, luisant en dessus. En ovale très court et convexe. Tête d'un vert plus ou moins violâtre, à pubescence jaunâtre, courte et serrée, avec les antennes flaves, le labre et les palpes roux.

Corselet bronzé brillant avec une étroite bordure antérieure et une tache latérale assez large d'un bleu violet avec, dans l'angle antérieur, quelques poils clairsemés grisâtres, finement et densément punctué; moins rétréci en avant que chez *viridimicans*. Écusson concolore. Elytres d'un bronzé brillant, à ponctuation fine et dense avec les épipleures plus larges en avant, assez brusquement rétrécies aux deux tiers de la longueur.

Dessous d'un noir brun, plus clair sur le côtés de l'antépectus et les derniers arceaux du ventre. Mésosternum moins fortement punctué que dans les deux espèces précédentes. Méta sternum presque lisse, sauf à sa partie antérieure, prolongement intercoxal du premier arceau ventral avec quelques points petits, profonds et clairsemés. Pieds entièrement roux.

Long. 1.8 mm.

Cette espèce se distingue des précédentes par sa couleur bronzée, son corselet bicolore, sa taille en général un peu plus grande, sa forme plus ovale, sa ponctuation élytrale plus fine et plus dense, la ponctuation du dessous moins grosse et moins serrée.

LA JAMAÏQUE: Hope, 2. x. 1920; Lititz, 13. ix. 1920 (C. C. Gowdey).

*Psorolyma*, gen. nov.

Oblonga, glabra, nitida. Capito magno, fronte lata mandibulisque robustis, apice bifidis, instructo; thorace lato, convexo; elytris oblongis tenuemarginatis, apice conjunctim late rotundatis. Prosterno carinato, laminis abdominalibus extus apertis. Pedes graciles, unguiculi simplices.

Ovale oblong, glabre, aptère. Tête grosse, enchassée dans le prothorax jusqu'au bord postérieur des yeux, à front

large ayant au moins trois fois le diamètre d'un œil, séparé de l'épistome par une suture bien marquée; ce dernier transversal et très court, en forme de bande étroite. Labre ogival, aussi long que large à sa base. Mandibules grandes dépassant notablement le labre en avant, en forme de lame contournée, bifides à l'extrémité. Yeux entiers, assez fortement granulés, saillants, dépassant un peu sur les côtés la partie antérieure du corselet. Palpes maxillaires sécuriformes; antennes insérées à la partie interne des yeux et tout près d'eux, grêles, allongées, atteignant la base du corselet, composées de dix articles: le premier légèrement renflé, les intermédiaires un peu plus longs que larges, les trois derniers formant une massue allongée, peu épaisse, aplatie, avec des soies latérales assez longues, à dernier article anguleux au sommet.

Corselet à peu près trois fois aussi large que long, convexe sur le disque, presque droit sur les côtés qui sont très finement relevés, avec les angles arrondis, légèrement rétréci d'arrière en avant, très finement pointillé.

Écusson bien visible, en triangle équilatéral, de la largeur du cinquième d'un élytre à la base.

Elytres oblongs, un peu plus de deux fois plus longs que larges, de la largeur du corselet à la base, munis sur les côtés d'un fin rebord; épipleures planes, étroites, sans fossettes, ne dépassant pas la courbure postérieure des élytres.

Prosternum caréné, étroit entre les hanches; cavités cotyloïdes antérieures ouvertes; mésosternum rétréci d'avant en arrière, lisse, coupé droit à ses deux extrémités, à peine plus long que large. Métasternum grand, convexe, marqué d'un fin sillon longitudinal. Abdomen de six segments, à prolongement intercoxal du premier arceau médiocrement large, légèrement convexe à sa partie antérieure. Lignes abdominales en segment de cercle atteignant à peu près vers le quart externe de la largeur le bord postérieur du segment abdominale et se confondant avec lui.

Pattes grêles; fémurs atteignant juste la partie externe des épipleures, sillonnés profondément en arrière pour recevoir les tibias qui sont minces, plus courts que les fémurs; tarses à articles 1 et 2 non bilobés, ongles simples.

Ce genre appartient au groupe des Rhizobiides et se rapproche beaucoup du genre *Bothynella*, Weisc, dont il diffère par ses yeux saillants, l'étroitesse de l'épistome et la longueur de ses mandibules qui lui donne un facies tout particulier. Le système de coloration de l'unique espèce connue jusqu'ici est également tout à fait différent.

*Psorolyma maxillosa*, sp. n.

Ovalis, convexa, nitida, cœrulea; subtus picco-brunnea; antennis, palpis pedibusque pallide flavis. Mandibulis exsertis, oculis prominentibus distinctissimis.

Ovale médiocrement convexe, d'un bleu foncé brillant en dessus, d'un brun plus ou moins noirâtre en dessous.

Tête grosse, convexe, légèrement impressionnée sur le front qui est large et légèrement bombé, d'un bleu brillant un peu plus clair que sur les élytres, avec l'épistome, le labre, les mandibules, les palpes et les antennes roux; lisse avec quelques points épars. Antennes minces, atteignant à peu près la base du prothorax avec une massue concolore allongée, pubescente. Yeux assez fortement granulé-, saillants.

Corselet fortement transversal, convexe, finement relevé sur ses bords latéraux, d'un bleu brillant, à ponctuation extrêmement fine et peu dense; en arc de cercle large à la base, non rebordé, faiblement concave à sa partie antérieure, avec les angles arrondis; ne recouvrant pas les yeux.

Elytres régulièrement ovales, de la même couleur que le corselet, finement rebordés, à ponctuation grosse et peu dense, avec des épipleures étroites, planes, ne dépassant pas la courbure élytrale postérieure, de couleur brun noirâtre.

Prosternum étroit, caréné, mésosternum plus large et finement rebordé en avant, lisse; métasternum lisse, grand, convexe, sillonné longitudinalement; abdomen de six segments, prolongement intercoxal du premier arceau atteignant environ le septième de la largeur de la base du segment; ligne abdominale en arc de cercle, confondue à partir du quart de la largeur avec le bord postérieur du segment abdominal; dessous d'un brun foncé, plus clair sur les quatre derniers arceaux de l'abdomen.

Pattes grêles, d'un flave pâle avec les ongles simples.

Long. 2.5 mm.

PORTO-RICO: Lares, 19. iv. 1921 (G. N. Wolcott).

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XLIV.—*Descriptions and Records of Bees*.—XCIII.

By T. D. A. COCKERELL, University of Colorado.

*Anthophora macroleuca*, sp. n.

♂.—Length about or nearly 10 mm.

Legs simple, with dark brown spurs, those on hind legs very long; clypeus, labrum, and mandibles white, the labrum

with two small round black spots, the mandibles black at end, with a band of red before the black; scape black, flagellum rather long, obscurely reddish beneath; third antennal joint very short, not much longer than fourth. Eyes very pale ochreous; hair of face, cheeks, and pleura abundant, pure white, of head and thorax above tinged with tawny (especially just behind wings), but not at all mixed with black; tegulae pale testaceous. Wings clear hyaline, nervures reddish. Legs black; hind femora not incrassate; hair of legs white; hind basitarsi with black (slightly brownish) hair on inner side. Abdomen with very broad dense hair-bands, tinged with tawny; apex bidentate; venter with white hair right across.

Quetta, India (*Nurse*).

Closely related to *A. delicata*, Ckll., to which it runs in the table in 'Entomologist,' 1911, p. 237. It differs by the absence of dark hairs on thorax above, the hair-band on second abdominal segment much broader and strongly tinged with fulvous (pure white in *delicata*), the spots on labrum, the colour of the eyes, the white (instead of black) hair on underside of hind femora, &c. It is also evidently related to *A. nigricornis*, Morawitz, but differs by the absence of dark hairs on thorax above, the paler tegulae, and the moderate and not acute bidentation of apex of abdomen. There is a strong superficial resemblance to *A. velocissima*, Fedt., also and by Col. Nurse at Quetta.

*Melissodes thelypodii*, Cockerell — —

♀.—Las Cruces, New Mexico, Sept. 7, at flower.  
*Ipomura hirsutula*, Jacq. (*Cockerell*).

*Eucera microsoma*, n. n.

*Eucera pumila*, Pérez, 1910; near Homs, Syria (not *E. pumila*, Klug, 1845).

*Tetraloniella graja nursei*, subsp. n.

♀ (type).—Dull ferruginous, with the hind margins of the abdominal segments brighter and paler red; pubescence very pale, mainly white, tinged with ochreous on mesothorax and scutellum, where it is short and very dense; ventral segments of abdomen with reddish-golden hair; eyes pale greenish; clypeus entirely cream-colour; antennae entirely bright ferruginous; scopa of hind legs creamy white.

♂.—Antennae very long, entirely red

Quetta, India, June 1903 (*Nurse*).

This was determined by Friese as *T. graja*, Ev., var. He was no doubt influenced by the fact that there is an intermediate race (var. *syriaca*, Friese) in Syria; but our insect is still paler and redder, and is perhaps a distinct species.

*Tetraloniella phryne* (*Nurse*).

Specimens from Deesa (*Nurse*) have been labelled by Friese *dentata*, Klug, var., but they are very distinct by the red flagellum and other characters, and I think *Nurse* was entirely justified in separating them. *Tetralonia leucopoda australior*, Ckll., proves to be a slight variation of *phryne*. The venational character is not constant.

*Tetraloniella dentata macrozona*, subsp. n.

♀.—Pale yellow clypeal band very broad, with an angular median projection above, on each side of which the yellow is angularly incised; eyes pale green; antennæ black; scopa on hind legs white on outer side, pale ferruginous on inner; hair of thorax above pale fulvous, with large, bare, shining, punctate areas on scutellum and hind part of mesothorax; abdominal bands broad and creamy white; bare black area on second segment shorter, with much less convex upper margin, than in *phryne*; maxillary palpi much shorter than in *phryne*; sides of second and following abdominal segments with red keels.

Quetta, May 1904 (*Nurse*).

It represents a distinct species. In the only female *dentata* I possess (from Tangier) the eyes are deep red. This is certainly nearer to *dentata* than is *phryne*.

It now becomes evident that *Xenoglossodes*, Ashm., of America, cannot be separated from *Tetraloniella*, and the species are herewith transferred. For bibliographical details, see Bull. Amer. Mus. Nat. Hist. xli: 202.

TETRALONIELLA, Ashmead.

(A) North America:

<i>albata</i> (Cress.).	<i>imitatrix</i> (Ckll. & Porter).
<i>eriocarpi</i> (Ckll.).	<i>lippice</i> (Ckll.).
<i>excurrents</i> (Ckll.).	<i>lippice semilippice</i> (Ckll.).
<i>gutierrezii</i> (Ckll.).	<i>neotomæ</i> (Ckll.).
<i>helianthorum</i> (Ckll.).	<i>wilmattæ</i> (Ckll.).

South America (Argentina):

*mimetica* (Bléthes).

The apical half of the mandibles is mainly red, and the slender teeth at sides of base of sixth abdominal segment are red. It therefore seems evident that *taurus* is at least a valid subspecies. True *polycentris* gets as far east as the Caucasus.

I have not seen the female of *taurus*, but from Nurse's description it would seem that the apical ventral plate is not nearly so long as in *polycentris*.

*Paracaelioxys rufiventris nursei*, subsp. n.

♀.—Mandibles bright ferruginous, black at apex; legs red; abdomen entirely red, truncate and emarginate at apex; vertex thinly hairy.

Length about 10 mm.

Deesa, India, March 1900 (*Nurse*).

Friese labelled this *rufiventris*, Spin., but the typical *rufiventris*, from Egypt, is larger and has black legs. The male of *nursei* is not known, but it probably has a black abdomen, as in *rufiventris*.

*Paracaelioxys* resembles *Liothyrapis* in having bare eyes, but the structure of the abdomen is quite different. The genus is new to India.

All the new Indian bees described above are represented in the Nurse collection at the British Museum.

*Megachile diodontura*, sp. n.

♂.—Length about 7.5 mm., anterior wing 7 mm.

Black, with head almost as large as thorax and short broad abdomen; mandibles black; antennal joints 4 to 10 chestnut-red beneath, the apical part of 10 blackened; clypeus exposed, convex, shining, with scattered strong punctures; long black hair at sides of clypeus and below antennæ, but hair of face and front mainly cream-colour, with a long beard from lower margin of clypeus; vertex with short, thin, pale hair, and some longer hairs interspersed; a band of dark hairs across front just above antennæ; vertex dull, very finely rugoso-punctate, the former with a short smooth line on each side; hair of mesothorax short, thin, pale yellowish, the hind margin (scutello-mesothoracic suture) with a narrow but very distinct pale band; scutellum with stiff black hair; pleura with dull white hair; tegulæ ferruginous. Wings dilute orange, with clear ferruginous stigma and nervures, but apically broadly infuscated. Legs very dark reddish-black, with short pale hair; anterior tarsi simi-

coxae with rather short sharp spines; spurs dark brown. Abdomen shining, with entire transverse sulci at bases of second and third segments; first segment with short black hair, the following with thin pale pruinose pubescence, the broad margin of fourth, and fifth and sixth entirely, densely covered with very bright ochreous felt-like tomentum; sixth segment with a pair of parallel acute red spines, ventral segments beyond the first with ochreous hair-bands.

Zaruma, Ecuador, October 1915 (*F. W. Rohwer*).

This belongs to a section or subgenus which was first made known by Spinola in 1853, when he described *M. xanthura* from Pará. Spinola had only the female, but Vachal, in 1908, briefly described what he considered to be the male from French Guiana, Ecuador, and Bolivia. In the same year Schrottky described a close relative as *M. bertonii* from Paraguay, and in 1913 he suggested that Vachal's male was not the true *xanthura*, but *bertonii* or closely related to it. Finally, Friese, in 1916, described *M. xanthura*, var. *brunneipennis*, from Costa Rica and Peru, querying whether it might be identical with *bertonii*. The short description appears to confirm this idea.

*M. microsoma*, Ckll., 1912, from Brazil, is very close to *M. bertonii*, differing in the pure white hair fringing clypeus, the fewer punctures in middle of clypeus, the more shining mesothorax, and the more acute and equilateral teeth at end of abdomen. The *M. bertonii* compared was received from Schrottky. *M. diodontura* differs from these species by the orange-tinted wings, red teeth or spines at end of abdomen, &c.

*M. bidentis*, Ckll., from Mexico, is of this alliance, and has wings coloured as in *M. diodontura*, but the teeth at end of abdomen are very short, triangular, and black. *M. aurantiipennis*, Ckll., from Guatemala, has no coxal spines, apical spines of abdomen black, &c.

### *Halictus distinctus*, Walker, 1871.

♀.—Type in Brit. Museum.

Wady Genneh.

Hair-bands on apical margins of abdominal segments; third s.m. very broad above, first r.n. joining second s.m. some distance before end; area of metathorax entirely dull, minutely rugose in middle, at sides with fine plicae; head broad, almost circular seen from in front; hind spur with  
teeth.



*Halictus tibialis*, Walker, 1871.

♂.—Type in Brit. Museum.

Wady Ferran.

Clypeus strongly produced, shining, with yellow apical band; second s.m. very broad.

Probably male of *distinctus*.

*Bombus nasutus*, Smith, 1852.

Meade-Waldo regarded *B. breviceps*, Sm., as a synonym. I examined workers of both in the Wilson Saunders collection at Oxford, and, although they are very much alike, I could separate them on the malar space, which in *breviceps* is shorter than its apical width, while in *nasutus* it is longer than the apical width.

*Plesianthidium fulvopilosum*, Cam., 1905.

Large and robust; light tegumentary marks only on face; sides of abdomen with fulvous or red hair; maxillary palpi 3-jointed, second joint robust; pulvilli present; second r. n. going beyond outer t.-c.

S. Africa.

On the venation and palpi the genus would fall as a synonym of *Paranthidium*, T. & W. Ckll., 1901; but it is obviously an independent development.

## PROTOANTHIDIUM, Cam., 1902.

This is not the same as *Protanthidium*, T. & W. Ckll., 1901. I saw Cameron's three species (from Borneo) in the British Museum. All have the second b.n. going beyond outer t.-c., and pulvilli present. They may be transferred to *Dianthidium*, as follows:—

*D. rufobalteatum* (Cam.).—Wings dusky, but not bicoloured; antennæ long; clypeus and lateral face-marks chrome-yellow, shining. Male.

*D. rufomaculatum* (Cam.).—Smaller than *ovatum*, with the stigma clear red, which is not true of the other two. On the other hand, it agrees with *ovatum* in having the wings bicoloured, the basal half fuliginous, the apical abruptly hyaline, with a rather milky effect.

*D. ovatum* (Cam.).

# XIV.—*The Morphology of some Cretaceous Cirripedes.*

By THOMAS H. WITHERS, F.G.S.

[Plate V.]

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THIS may be taken as a continuation of my paper on “Some Cretaceous and Tertiary Cirripedes referred to *Pollicipes*” (Ann. & Mag. Nat. Hist. 1914, ser. 8, vol. xiv. pp. 167–206, pls. vii., viii.). While I had the intention later of taking up the study of the species included here, the material at my command does not allow me at present to deal with them in such a comprehensive manner as I should like; but the fact that a species of this group has to be included in my account of the Rügen Chalk Cirripedes has compelled me to write the present note.

In the Cretaceous rocks are found quite commonly certain simple types of Cirripede valves that have been in the main ascribed to various species of *Pollicipes*. The geologically oldest of these is *Pollicipes bronni*, Roemer, from the Middle Neocomian (Hilseconglomerat) of Essen, Westphalia, hitherto known only by the carina, but we are now able to add the scutum and tergum (Pl. V. figs. 11, 12). This is followed in the Albian by the common *Pollicipes unguis*, J. de C. Sowerby, from the Gault of Folkestone, Kent, and *Pollicipes imbricatus*, Withers, from the Blackdown Beds of Blackdown, Devonshire, and in the Chalk by *Pollicipes glaber*, Roemer, and a number of allied species. It would appear that *P. glaber* is the direct descendant of *P. unguis*, and from *P. glaber* has arisen at different horizons in the Chalk a number of forms that are sufficiently distinct to warrant authors in giving them specific rank.

The following are the species considered by me in this paper as constituting a single natural group, but when these species come to be studied more carefully in detail there is no doubt at all that the number will be decreased:—

Danian—Cenomanian:

*Pollicipes angelini*, Darwin (carina and tergum only).

*Scalpellum attenuatum*, H. Woodward.

*Pollicipes billaulti*, Peron.

„ *conicus*, Reuss.

*Pollicipes*? *corrugatus*, H. Woodward.

*Pollicipes costatus*, Kafka.

„ *cuspidatus*, Kafka.

*Pollicipes filusus*, Withers.

„ *gamigensis*, H. B. Geinitz.

„ *glaber*, F. A. Roemer.

*Scalpellum longissimum*, Withers.

„ *oppoliense*, Leonhard.

*Pollicipes striatus*, Darwin.

„ „ var. *paucistriatus*, H. Woodward.

Albian :

*Pollicipes unguis*, J. de C. Sowerby.

„ *imbricatus*, Withers.

Neocomian :

*Pollicipes bronni*, F. A. Roemer.

All the species enumerated above were founded on detached valves, and in the case of *P. unguis* and *P. glaber* only has any number of valves been found in their natural position. All the valves have apical umbones. The carina, where known, is simple in structure, and by this I mean that it is not separated by means of ridges or alteration in direction of growth-lines into tectum, parietes, and intraparietes, for these parts are not defined, and the valve is strongly convex to flatly-arched in transverse section. The scutum, in addition to the apico-basal ridge, has a second ridge, more or less prominent in the several species, extending from the apex to about the middle of the basal margin, and like the *Arcoscalpellids* has a comparatively wide tergo-lateral portion, which, however, varies in width in the several species. The tergum is not in any way peculiar, but the valve is usually rounded and protuberant along the occludent margin, followed by a rather wide furrow extending to the scutal margin. The upper latus is rather simple, and forms almost an equilateral triangle, with the scutal side a little longer than the tergal, but with no elaboration of structure, such as the truncation of the basal angles and the growth-lines upturned at the sides. Of the lower latera, the carinal latus is the valve more frequently found, and this is subtriangular to oblong in shape, and is about twice as large as the rostral and inframedian latus, which are almost exactly similar in shape and size. The rostrum is subtriangular, large, and wide, usually with an apico-basal ridge. The peduncular plates are large, with a smooth, narrow, inwardly-projecting ledge; on the inner margin of this ledge in the plates belonging to *P. unguis* there is a median elliptical socket, but I have not noticed such a feature in the numerous peduncular plates that I have seen of *P. glaber*.

*Pollicipes glaber* would in itself appear to be an extremely variable form, but whether the allied forms, occurring mainly in the upper zones of the Chalk, are really offshoots from that species, or whether they constitute closely-allied and parallel species, can be determined only by getting together a collection of properly-collected material from different horizons. I have already gone some way in this direction, but the purport of this paper is not to discuss the species so much as to work out the structure of the capitulum, and to gain some idea as to the phylogenetic position of the group of species.

Since most of the evidence is exhibited by the species *Pollicipes unguis*, we will now proceed to discuss the material, but it would seem unnecessary here to describe the valves of this species in detail, since this has already been done by Darwin, and myself in the case of the scutum.

*Scalpellum (Cretiscalpellum) unguis* (J. de C. Sowerby).  
(Pl. V. figs. 1-10.)

- 1836. *Pollicipes unguis*, J. de C. Sowerby, Trans. Geol. Soc. ser. 2, vol. iv. p. 335, pl. xi. fig. 5<sup>t</sup>.
- 1836. *Pollicipes lavis*, J. de C. Sowerby, *ibid.* pl. xi. fig. 5 (non pl. xvi. fig. 1).
- 1845. Non *Pollicipes unguis*, J. de C. Sowerby; A. Reuss, Bohm. Kreidef. p. 17, pl. v. fig. 44.
- 1850. *Pollicipes unguis*, J. de C. Sowerby; H. B. Geinitz, Das Quadersandsteingeb. p. 100.
- 1850. *Pollicipes lavis*, J. de C. Sowerby; H. B. Geinitz, *ibid.* p. 100.
- 1851. *Pollicipes unguis*, J. de C. Sowerby; C. Darwin, Pal. Soc. Monogr. Foss. Lepadidae, p. 64, pl. iv. fig. 1.
- 1854. *Pollicipes unguis*, J. de C. Sowerby; C. Darwin, Ray Soc. Monogr. Subclass Cirripedia, Synop. et Index Systematicus, p. 637.
- 1854. *Pollicipes unguis*, J. de C. Sowerby; J. Morris, Cat. Brit. Foss. 2nd ed. p. 96.
- 1865. *Pollicipes unguis*, J. de C. Sowerby; Salter and H. Woodward, Cat. & Chart Foss. Crustacea, p. 27, pl. i. fig. 6.
- 1877. *Pollicipes unguis*, J. de C. Sowerby; H. Woodward, Brit. Mus. Cat. Brit. Foss. Crustacea, p. 141.
- 1886. Non *Pollicipes unguis*, J. de C. Sowerby; J. Kafka, Sitz. Ber. k. Bohm. Gesell. Wiss. Prag (1885), p. 573 (= *P. glaber*, Roemer).
- 1887. Non *Pollicipes unguis*, J. de C. Sowerby; Fritsch and Kafka, Crust. Böhmischen Kreidef. p. 12 (= *P. glaber*, Roemer).
- 1910. *Pollicipes unguis*, J. de C. Sowerby; Withers, Geol. Mag. dec. v. vol. vii. p. 498, text-figs. 4, 5a, b.

*Diagnosis*.—Carina bowed inwards, comparatively wide at the base, and the basal margin bluntly pointed and usually somewhat rounded; rostrum subtriangular, bowed inwards, and transversely convex; carinal latus with the upper and

lower margins subparallel, and the lateral and carinal margins almost equal in length, the valve being somewhat oblong in shape.

*Distribution*.—Albian, Gault: Folkestone, Kent; Dienville (Aube), France.

J. de C. Sowerby (1836, pl. xi. fig. 5\*) established the species *Pollicipes unguis* on two valves, which presumably represent a rostrum and a carinal latus, and at the same time (1836, pl. xi. fig. 5) gave the name *Pollicipes lævis* to a carina and two terga which really belong to *Pollicipes unguis*.

Darwin (1851, p. 64, pl. iv. fig. 1) for good reasons thought it advisable to adopt the name *P. unguis* in preference to *P. lævis*, and he figured a number of detached valves, mostly fragmentary, said by him to belong to a single individual. They comprised "a carina and pair of terga, much mutilated, a rostrum, sub-rostrum, a pair of upper latera, a pair of latera of the lower whorl from the carinal end of the capitulum, and two other latera of this same whorl from one side of the rostral end of the capitulum." From Darwin's statement as to the incompleteness of the terga and carina, as well as from the present state of the specimens, which are in the Geological Survey Museum, registered 31378, it is quite evident that other specimens must have been used in the drawing of the figures. The carina could not have been drawn from the present fragment, for a part is present which is broken off in Darwin's figure, and the terga, which Darwin himself said were much mutilated, must have been very much restored. The upper latus is drawn much too symmetrically. None of the figures of the lower latera are very accurate, and the subrostrum has apparently been lost, since it is not with the other valves.

With regard to the lower latera, Darwin further said (1851, p. 66): "these consist of two small [attached] valves (*l, k*), namely (judging from the position in which, overlapping each other, they were embedded), the first and second, or more probably the second and third right-hand rostral latera of the lower whorl; and a pair (*h, i*) (right-hand and left-hand) of latera, of about twice the size of the two anterior ones, which must have come from the carinal half of the whorl, but the exact position of which I cannot tell."

Concerning the number of valves, Darwin said (1851, p. 67): "With respect to the number of valves in the whole capitulum, it is almost useless to speculate: we have two scuta, two terga, two upper latera, two rostra, and we may, perhaps, infer two carinæ, making ten valves, we know of

three pair of lower latera, making sixteen valves: I believe there must have existed some other latera, but probably only a few more; for these valves, especially the carinal pair, are much larger, in proportion to the scuta and terga, than in any recent *Pollicipes*. Probably the lower latera, together with the sub-rostrum, and perhaps a sub-carina, formed only a single lower whorl."

For some years now I have not been altogether satisfied in my own mind with Darwin's interpretation of these remains, and more especially their reference to the genus *Pollicipes*, but, in view of Darwin's opinion as to the number of valves forming the capitulum, it was necessary to get proof before raising any discussion, and by the preparation of a number of specimens this has now been obtained.

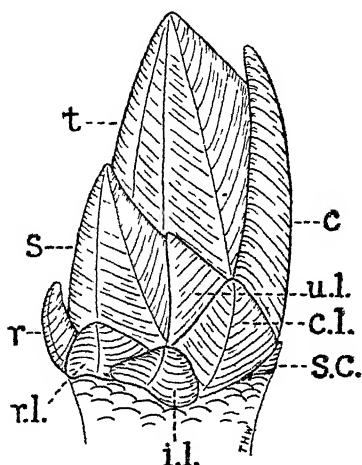
In 1910 (p. 499, text-fig. 4) I figured a small incomplete capitulum of *P. unguis* showing the right side, and this consisted of the carina, scutum, tergum, upper latus, and carinal latus. That specimen not only showed the scutum, unknown to Darwin, but the valves were preserved in their natural position, and it proved the position of the carinal latus. Darwin certainly did recognise this latter valve of *P. unguis* as a carinal latus, but, curiously enough, the homologous valve in the closely-related species *P. glaber* (1851, pl. iii. fig. 10*l*) was regarded by him as a "Latus (probably from near the rostrum)."

Two specimens carry the evidence a stage further. One (Pl. V. fig. 1) in the Geological Department of the British Museum, registered 59802, exhibited the inner surface of the valves of the right side of an incomplete capitulum, and, when these were filled with plaster and the matrix taken away from their upper surface, the valves were seen to be almost in their natural position and to consist of the carina, tergum, carinal latus, and inframedian latus. The second specimen (Pl. V. fig. 2) is in the Sedgwick Museum, Cambridge (Wiltshire collection), and exhibits the carina, and on each side the carinal latus, followed by the left and right inframedian latus.

Turning now to other specimens in the Geological Department of the British Museum, one, registered 41300, shows remains of more than one capitulum. From this specimen were obtained five peduncular plates, of which two are figured (Pl. V. figs. 9, 10). There is on the matrix, in addition to a carina, paired terga, and upper latus, a left carinal latus and two other lateral valves attached together (Pl. V. fig. 3). Now one of these last two valves is the opposing valve of that which we know from specimen 59802

*Morphology of some Cretaceous Cirripedes.*

(Pl. V. fig. 1) to be the inframedian latus, and it follows from this that the other valve must be the rostral latus. Two similar valves were exhibited apart from each other on specimen I. 1573 (Pl. V. figs. 4 *a, b*), and these may have belonged to a single individual. In both specimens 44300 and I. 1573 the two valves, although much larger, are exactly similar in structure to the two attached valves (Pl. V. fig. 5) figured by Darwin (1851, pl. iv. fig. 1 *k*), and consequently the latter valves are the *left* rostral and inframedian latus, and not right-hand valves as supposed by Darwin. Moreover, in all the specimens, these two valves



*Scalpellum (Cretiscalpellum) unguis* (J. de C. Sowerby). Albian, Gault: Folkestone, Kent. Restoration of capitulum.

*c*, carina; *s*, scutum; *t*, tergum; *u.l.*, upper latus; *c.l.*, carinal latus; *i.l.*, inframedian latus; *r.l.*, rostral latus; *r*, rostrum; *s.c.*, subcarina.

show that the rostral latus was not only overlapped by the inframedian latus, but the two valves are very similar in shape and size. Consequently, if the rostral latus was placed in position beneath the inframedian latus in the specimen 59802 (Pl. V. fig. 1), there would be no room for further latera.

So far, then, we have proved that the capitulum consisted of a carina, two scuta, two terga, two upper latera, and three pairs of lower latera only, making thirteen valves in all. In addition, we know that there was a large rostrum, and Darwin figured a valve which he called a subrostrum. I cannot conceive how the latter valve could have formed part of

the rostral end of the capitulum, especially beneath such a large wide plate as the rostrum actually is, and in my opinion it is a subcarina, for which there is room between the carinal latera—otherwise there would be a hiatus between the incurved outer margins of these valves.

The capitulum has therefore fifteen valves only of which there is any proof, and, in view of the large size of the lower latera, it is extremely unlikely that there were any more. Had there been more it is quite certain that fragments would have turned up in the large amount of material that I have examined, for several other specimens exhibit lower lateral valves and in some cases the peduncular plates. While Darwin thought that there were more than three pairs of lower lateral valves, he was of the opinion that there was only a single lower whorl, and, since it has now been shown that there could have been only three pairs of latera, there remains no justification, quite apart from other considerations, for the reference of this form, and by inference the related species, to the genus *Pollicipes*. A restoration is given of the capitulum, and except in the case of the rostrum and subcarina, the exact position of each valve is proved by one or other of the specimens discussed here.

Evidence for this restoration is just as strong in the case of the allied species *Pollicipes glaber* from the Chalk Marl. Precisely similar valves to those known to comprise the capitulum of *P. unguis* have been found detached, including a great number of the peduncular plates, and the absence of any other type of valve, although negative evidence, is strong confirmation of the above conclusion.

The structure of the capitulum of *P. unguis* shows that it represents a type distinct from those already known, but, in deference to the views of certain eminent authorities on recent Cirripedes, I refrain from making it a distinct genus, and content myself with regarding it as a subgenus of the genus *Scalpellum*, s. str., definable as below:—

CRETISCAPELLUM, subgen. nov.

Scalpellids with the upper whorl of valves as in the subgenus *Arcoscalpellum*, except that the carina is simple (that is, not divided off into tectum, parietes, and intraparietes), and with three pairs of large practically undifferentiated lower lateral valves, of which the inframedian latus overlaps the rostral and carinal latus on either side; rostrum exceptionally large and wide; peduncular plates large with a smooth, narrow, inwardly-projecting basal ledge.

*Subgenotype*.—*Scalpellum* (*Cretiscalpellum*) *unguis* (L. de C. Sowerby).



*Scalpellum (Cretiscalpellum) bronni* (F. A. Roemer).  
(Pl. V. figs. 11-16.)

1841. *Pollicipes bronni*, Roemer, Verst. Norddeutschen Kreidegeb. p. 103, pl. xvi. fig. 8.  
 1845. Non *Pollicipes bronni*, Roemer; A. Reuss, Verst. d. Böhmischen Kreidef. p. 16, pl. v. figs. 40, 41, pl. xii. fig. 4 (= *P. glaber*, Roemer).  
 1845. Non *Pollicipes bronni*, Roemer; H. B. Geinitz, Grundriss der Versteiner. p. 247, pl. ix. fig. 22 (= *P. glaber*, Roemer).  
 1850. *Pollicipes bronni*, Roemer; H. B. Geinitz, Das Quadersandsteingeb. p. 100.  
 1851. *Pollicipes bronni*, Roemer; Darwin, Pal. Soc. Monogr. Foss. Lepididae, p. 77, pl. iv. fig. 10.  
 1852. *Pollicipes bronni*, Roemer; F. A. Quenstedt, Handb. der Petrefaktenkunde, p. 304, pl. xxi, figs. 17 a-c.  
 1854. *Pollicipes bronni*, Roemer; Darwin, Ray Soc. Monogr. Subclass Cirripedia, Synop. et Index Systemat. p. 639.  
 1865. *Pollicipes bronni*, Roemer; Salter and H. Woodward, Cat. & Chart Foss. Crustacea, p. 27, pl. i. fig. 7.  
 1877. *Pollicipes bronni*, Roemer; H. Woodward, Brit. Mus. Cat. Brit. Foss. Crust. p. 139.  
 1883. *Pollicipes bronni*, Roemer; F. A. Quenstedt, Handb. der Petrefaktenkunde, 3rd ed. Abth. ii. p. 467, pl. xxvii. fig. 9.  
 1886. Non *Pollicipes bronni*, Roemer; J. Kafka, Sitz.-Ber. k. Böhm. Gesell. Wiss. Prag (1885), p. 570, pl. ii. figs. 3a-c (= *P. glaber*, Roemer).  
 1887. Non *Pollicipes bronni*, Roemer; Fritsch and Kafka, Crust. Böhmischen Kreidef. p. 9, fig. 14 (= *P. glaber*, Roemer).  
 1889. Non *Pollicipes bronni*, Roemer; A. Fritsch, Arch. naturw. Landesd. Böhmen, Prague, Bd. vii. p. 95, fig. 11b (= *P. glaber*, Roemer).  
 1889. Non *Pollicipes bronni*, Roemer; A. Peron, Bull. Soc. Sci. Yonne, Tom. xli (1887), p. 252 (= *P. glaber*, Roemer).

*Diagnosis.*—Carina smooth, subcarinated, with the lower part of the valve unusually wide, and its upper part almost always bowed outwards. Scutum with the whole tergo-lateral portion bent almost at right angles to the remainder of the valve. Tergum with the upper carinal margin unusually short, being about one-third the length of the lower carinal margin.

*Remarks.*—Hitherto this species has been represented by the carina only. It is therefore an important addition to be able to add the scutum and tergum. The scutum and tergum doubtfully referred by Peron to this species came from the Cenomanian chalk, and are almost certainly referable to *P. glaber*.

*Distribution.*—Middle Neocomian, Hilsconglomerat: Essen-on-the-Ruhr, Westphalia.

*Material.*—Several valves of this species from the type-locality are in the Geological Department of the British Museum, and comprise eleven carinae, registered L. 11031,

I. 15447—I. 15456, and another more important set comprising two carinæ (I. 15443–4), one scutum (I. 15445), and a tergum (I. 15446).

*Measurements.*—The following are the measurements of the scutum and tergum, and the largest carina:—

	Length. mm.	Breadth. mm.
Carina (Pl. V. fig. 15) . . . .	22.1 (when complete probably about 25 mm.).	11.2
Scutum (Pl. V. fig. 11) . . . .	18.2	9.3
Tergum (Pl. V. fig. 12) . . . .	17.3	8.4

*Description.*—All the valves of this species seen by me from Essen are much worn, and the comparatively coarse sand-grains composing the matrix have in most cases pitted the surface of the valves. From certain valves that are well preserved it would appear that the surface was originally smooth, except for the faint transverse growth-lines.

Carina triangular, unusually wide, about twice as high as wide, subcarinated, transversely semicircular, with the lateral margins slightly inflected, basal margin angular, formed of two curved lines making an angle of about 90°, the outer angles being produced into short spurs; the apical part of the valve is almost always bowed outwards to a variable extent. The growth-lines follow the outline of the basal margin, but on the inflected lateral edges they are slightly, but rather abruptly, upturned. On the inner surface the lower two-thirds of the valve is deeply concave, and the upper third of the valve is thick and solid, and no doubt freely projected to that extent. Two ridges, much more prominent in some valves than in others, and thickest in the middle, are produced on the solid apical portion, and they project beyond the lateral margins, from which they are separated by a distinct furrow.

Scutum subtriangular, moderately convex transversely, with the tergo-lateral portion abruptly bent downwards and inwards from the somewhat raised and rounded apico-basal ridge; ocludent margin moderately convex; basal margin almost straight, about half the width of the ocludent margin. On the inner surface the inner ocludent edge is moderately wide and marked with longitudinal lines; there is no very deep pit for the adductor muscle, but above the pit the valve is thick and solid; the apical part of the tergo-lateral edge is broken in this specimen, but it appears to have been much produced inwards, forming a fairly deep furrow between it and the flattened inner ocludent edge.

Tergum subrhomboidal with a straight apico-basal ridge,

rather steeper on the carinal side, and a little nearer to the carinal than to the scutal angle. The surface of the valve slopes fairly evenly each side of the ridge. The upper and lower carinal margins are straight, the upper carinal margin being about one-third the length of the lower, and forming with it an angle situated about one-fifth the length of the valve from the apex; occludent margin slightly convex, a narrow rim along this margin being somewhat protuberant and divided off from the rest of the valve by a parallel depression which is wider towards the scutal margin; scutal margin almost straight, slightly produced below the protuberant occludent rim, and forming with the occludent margin an angle situated nearly two-thirds the distance from the apex. On the inner surface the inner occludent edge is rather narrower than the upper carinal edge, but both edges are narrow and are marked with growth-lines indicating that only a very small part of the valve freely projected.

*Remarks.*—This species is characterised not only by its unusually wide and outwardly bowed carina, but by the way in which the inner infilled apical part of that valve is produced into the two lateral and inwardly projecting ridges. Of the specimens from Essen one only (I. 15449) is not outwardly bent, but this is practically straight and cannot be said to be bowed inwards. It would seem therefore to be a fairly constant character for the carina to be bowed outwards, although in some recent species this feature is often variable. I have not seen a carina of the Gault *P. unguis* that is bowed outwards, but of the Chalk *P. gluber* one does rarely come across carinæ that are strongly bowed outwards. The scutum of *P. bronni* is peculiar in the strong inflection of the tergo-lateral portion, and the tergum in the shortness of the upper carinal margin.

I have not seen any examples of the carina from the Warminster beds referred by Darwin to this species, but, since the outward bending of the carina seems to be such a constant character of *P. bronni*, I am not at all sure that the Warminster form which is bowed inwards—and what is more important has a more tapering form—can be the same species.

#### PHYLOGENETIC POSITION.

The capitulum of *Cretiscalpellum* is remarkably erect and *Scalpellum*-like, and quite unlike the short and rather squat multi-valved capitulum of *Pollicipes* (*Mitella*). In the general build of the capitulum, and the relative position of

the valves, there is much resemblance to the forms of *Scalpellum* included in the subgenus *Arcoscalpellum*. This is more especially marked in the case of the upper whorl of valves which agree almost exactly in disposition, and except for the more simple carina, which is not divided off into tectum, parietes, and intraparietes, there are no distinguishing features. While there is a somewhat similar disposition of the lower whorl of valves to that in *Arcoscalpellum* there is a great difference structurally, for the inframedian latus *overlaps* the rostral and carinal latus on either side; the lower lateral plates are hardly at all specialized, for the rostral and inframedian latus are almost exactly alike in shape and size, and resemble very much the carinal latus, which, however, is about twice as large as the rostral and inframedian latus; the rostrum is comparatively very much greater in size than in any known *Arcoscalpellid*, in which latter it becomes exceedingly small or is entirely absent in the more recent forms. *Cretiscalpellum* is clearly related to *Arcoscalpellum*, but, while the valves have combined to form a somewhat similar capitulum, the individual valves, especially the carina and the lower latera, still retain their primitive structure, and have not become so specialized in shape as in *Arcoscalpellum* and the more specialized forms of *Scalpellum*, s. str.

There would seem to be some relationship also to *Calantica* (*Scillalepas*), especially in the lower whorl of valves. In *Scillalepas* there is no upper latus interposed between the scutum and tergum, the valve which is homologous with the upper latus in other forms being still a member of the lower whorl. The valves of the lower whorl in *Scillalepas* are not so differentiated in shape as in *Arcoscalpellum*, although more so than are the valves of *Cretiscalpellum*, and the median latus does not overlap the rostral and carinal latus, but on the contrary is overlapped on each side by those valves.

The structural resemblance of *Cretiscalpellum* is therefore closest to *Arcoscalpellum*, and this probably indicates not that *Arcoscalpellum* was derived from *Cretiscalpellum*, but that they had a common ancestor, which in some way was related to *Scillalepas*.

*Arcoscalpellum* has a known range from the Lower Cretaceous (Aptian) to Recent, *Cretiscalpellum* is known to exist still earlier in the Lower Cretaceous, for it occurs in the Neocomian, but it is not known more recent than the Danian, and *Scillalepas* has a known range from the Upper Cretaceous (Upper Senonian) to Recent, although it is probable that it existed in the Jurassic rocks.

For the loan of specimens my thanks are due to Mr. Henry Woods, F.R.S., of Cambridge University, and to Dr. F. L. Kitchin and the Director of the Geological Survey.

# EXPLANATION OF PLATE V.

*Scalpellum (Cretiscalpellum) unguis* (J. de C. Sowerby).

Albian, Gault: Folkestone, Kent.

- Fig. 1. Part of a capitulum, showing right side, with the valves slightly displaced and the scutum, upper and rostral latus added in outline. B.M., 59802.  
 Fig. 2. Carinal end of a capitulum from right side. Sedgwick Museum, Cambridge.  
 Fig. 3. Associated rostral and inframedian latera (from left side) B.M., 44300.  
 Fig. 4. Rostral and inframedian latera (from left side, found apart on a small piece of clay). *a*, outer view; *b*, inner view. B.M., I. 1573.  
 Fig. 5. Associated rostral and inframedian latera (from left side). Origl. of Darwin's pl. iv. fig. 1 *k*. Geol. Surv. Museum, 31378.  
 Fig. 6. Rostrum. Outer view. Origl. of Darwin's pl. iv. fig. 1 *e*. Geol. Surv. Museum, 31378.  
 Fig. 7. Rostrum. Outer view. B.M., I. 13467.  
 Fig. 8. Rostrum. Inner view. B.M., 41920.  
 Fig. 9. Peduncle plate. Outer view. B.M., 44300.  
 Fig. 10. Peduncle plate. Inner view of basal portion showing median elliptical socket. B.M., 44300.

Figs. 1-8,  $\times 2$  diam.; figs. 9 & 10,  $\times 6$  diam.

*Scalpellum (Cretiscalpellum) bronni* (F. A. Roemer).

Middle Neocomian, Hilsconglomerat Essen-on-the-Ruhr, Westphalia.

- |  |                    |
|--|--------------------|
| Fig. 11. Scutum (left). Outer view. B.M., I. 15445 | } $\times 2$ diam. |
| Fig. 12. Tergum (left). Outer view. B.M., 15446.   |                    |
| Fig. 13. Carina. Outer view. B.M., I. 15443.       |                    |
| Fig. 14. Carina. Inner view. B.M., I. 15444.       |                    |
| Fig. 15. Carina. Side view. B.M., I. 15447.        |                    |
| Fig. 16. Carina. Side view. B.M., I. 15448.        |                    |

For explanation of lettering see legend of text-figure.

XLVI.—*Deuterophlebia mirabilis*, *gen. et sp. n.*, a remarkable Dipterous Insect from Kashmir. By F. W. EDWARDS.

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[Plate VI.]

IN October 1921 Mr. Martin E. Mosely presented to the British Museum a few insects collected and sent to him by Mr. F. J. Mitchell, Honorary Director of Trout Culture in Kashmir; the specimens were obtained in the neighbourhood

of Srinagar, Kashmir, in or by mountain streams at a height of 11,000–12,000 ft. The collection contained only about half-a-dozen Diptera, but among these were two examples of the most extraordinary insect to be described below. Many of the characters of this species are so remarkable that there seemed at first room to doubt whether it might not be Neuropterous rather than Dipterous, the wings and head both suggesting the Ephemeroidea in some respects. After an examination of the literature, however, and after consulting my colleagues at the British Museum, and my friends Dr. C. P. Alexander, Mr. J. E. Collin, Mr. K. J. Morton, and Dr. D. Sharp, all possible doubt on the matter has been removed, and there can be no question that the insect represents a new Dipterous type for which it will be necessary to erect a special family. This new family is perhaps allied to the Blepharoceridae, themselves one of the most aberrant groups of the Diptera, but the differences are so great that there seems no justification for including the new genus within the Blepharoceridae. Some points of its structure even suggest the possibility that our insect may have some connection, however remote, with the Cyclorrhapha. I propose to name and define the family as follows:—

Fam. Deuterophlebiidæ, nov.

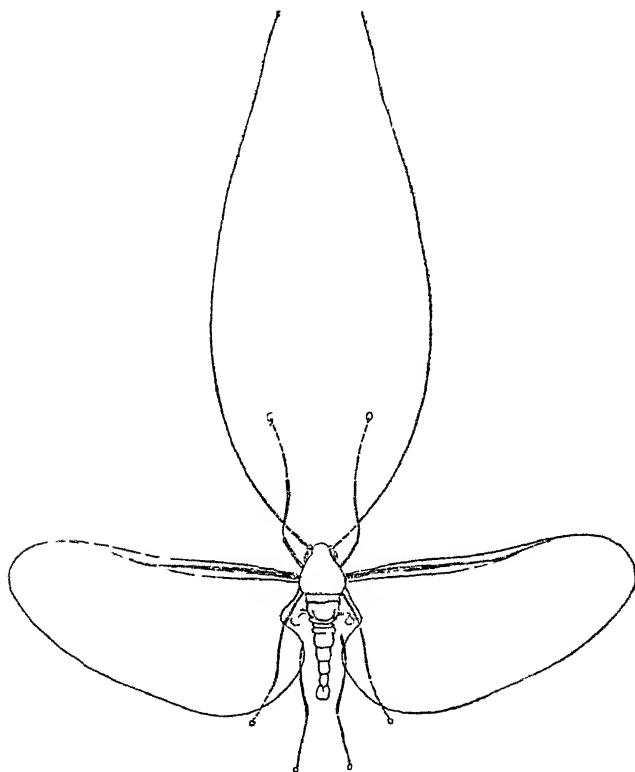
*Head* small, broad, and flat, hidden under the projecting mesonotum. No trace of mouth-parts. No ocelli. Antennæ 6-segmented, the last segment (at least in the ♂) several times longer than the whole body and practically bare, the remaining segments all rather short. *Thorax* very large, not much shorter than the abdomen; no distinct suture between the mesonotal præscutum and scutum. *Abdomen* with nine distinguishable segments (including the genital), but segments 1, 2, and 8 all very much reduced. No abdominal spiracles. *Legs*: coxæ all short. Tibial spurs absent. Tarsi with large subcircular empodia and each with only a single claw. *Wings* very large and broad, covered with dense microtrichia and with a fringe of fine hair round the posterior margin, but no trace of macrotrichia even on the costa. Hardly a trace of true veins, but an elaborate fan-like development of secondary folds, with transverse folds forming concentric lines. Halteres well developed.

Typical genus, *Deuterophlebia*, gen. nov., with the characters of the family.

The new genus differs from all known Blepharoceridae in the absence of mouth-parts and ocelli, the form of the

antennæ, the possession of large empodia, and the absence of a definite true venation in the wings, of macrotrichia along the costal margin, and of a chitinated arca at the base of the anal lobe of the wings. It resembles the Blepharoceridæ in the shape of the body and wings and in the possession of a well-marked "secondary venation"; this last, however,

Fig. 1.



*Deuterophlebia mirabilis*, gen. et sp. n.

Outline of whole insect,  $\times 6$ . (The writer is indebted to  
Mr. A. J. E. Terzi for the figure.)

is on an entirely different plan from that known in any Blepharocerid.

As Mr. J. E. Collin has pointed out to me, the antennal structure is curiously suggestive of the Cyclorrhapha, the long terminal segment with two short segments preceding it recalling the arista, with its two small basal segments, of

Cyclorhaphous families. The reduction of the basal segments of the abdomen might also seem to point in the same direction. However, the structure of the hypopygium is of a distinctly Nematocerous type, and not at all dissimilar to that of the Blepharoceridae. This organ almost certainly provides the most reliable evidence of relationship. The connection with the Blepharoceridae may therefore be expected to be confirmed when the larvæ and pupæ are discovered. It may be noted that some rather remarkable unidentified Blepharocerid larvæ from Kashmir have been described by Agharkar (Rec. Ind. Mus. x. 1911).

Unfortunately, nothing was noted by the collector concerning the habits of the flies, and only the male sex was obtained.

*Deuteroephlebia mirabilis*, sp. n.

Colour deep dull black ; abdomen less intense than the thorax ; wings greyish, slightly opaque.

*Head.* The head is rather small, and placed so far back under the projecting thorax that only small portions of the eyes are visible in a dorsal view. In shape the head is about one-third broader than long, and very thin and flat, its diameter from front to back being less than that of the rather small eyes. The front of the clypeus has a trilobed appearance, the middle lobe bearing a number of short bristles. The distance between the eyes is about half the breadth of the whole head. The occipital foramen is very large, occupying about two-thirds of the breadth of the head, and there is no distinct neck. The eyes are subspherical, without any trace of division into two parts, or of differentiation in the size of the facets. There is absolutely no trace of ocelli or of mouth-parts, but the mouth is present as a small oval opening on the under side of the head, leading directly into a chitinated internal tube. On each side of the mouth-opening is a small tubular pocket with strongly chitinated walls, near the opening of which is a small bristle. The *antennæ* consist of a two-segmented scape and a four-segmented flagellum ; the first five segments are together not much longer than the breadth of the head, but the remaining segment is fully three times as long as the whole body ; the scapal segments are transversely placed, the base of the flagellum at first continuing in the same direction, and then curving forwards. First scapal segment about twice as long as the second, and somewhat broader, second cup-shaped, somewhat oblique, and about as long as broad.



First flagellar segment cylindrical, about as long as the two scapal segments together, one or two short bristles on the inner or anterior surface near the tip. Second and third flagellar segments cylindrical, together slightly shorter than the first, each with a blunt pale prominence on the inner (anterior) side beyond the middle, the prominences bearing several short pale bristles; there are also a very few short and fine hairs on the dorsal surface. Terminal joint bare except for a few fine hairs near the base, tapering very slightly to just before the tip, which is slightly but distinctly swollen.

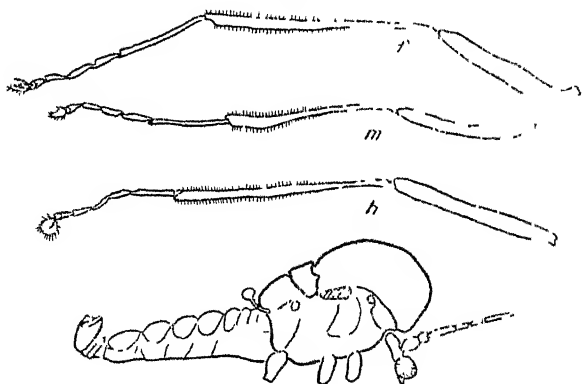
*Thorax* absolutely bare, the integument dull black. Pronotum not traceable. Mesonotum very convex and produced forwards over the head; rounded but rather narrow in front, very broad behind. No definite suture separating the præscutum and scutum, but deep and well-marked divisions between the scutum, scutellum, and postnotum. Area in front of scutellum flat. Scutellum extending to almost the full breadth of the mesonotum, and of even width throughout, its posterior margin slightly rounded. Postnotum large, convex. Owing partly to the intense blackness, it is difficult to make out the divisions of the pleuræ in the whole specimen, and the thorax of the mounted one is damaged. There is a rather large membranous area below and in front of the wing-root. The mesosternum is almost flat. The mounted specimen shows that the prothoracic and metathoracic spiracles are both large, and are each supplied with several tracheal trunks, uniting just inside the spiracular opening.

*Abdomen* broad at the base, and tapering considerably towards the tip, rather feebly chitinised, covered with a fine microscopic pubescence and with a few scattered transparent punctures on the tergites. First two segments very much reduced, without definite tergal plates, but quite distinguishable in the formalin specimen. Third segment as long as the first two together, but still small. Fourth to seventh all rather large, about equal in length, but decreasing in breadth. Eighth reduced to a mere ring, but more strongly chitinised than the preceding. There is absolutely no trace of spiracles in the abdomen—a very unusual condition for an adult insect, as it appears to me. Possibly the spiracles may be represented by groups of two or three minute bristles, which occur in the places where the spiracles would be expected. Tracheæ, reaching back from the thorax, are confined to the basal half of the abdomen. *Hypopygium* of very simple structure, not rotated, turned upwards.

Ninth tergite not distinguishable from the tenth, parallel-sided, with a broad V-shaped apical emargination, which is finely hairy. Side-pieces completely united with the ninth sternite, practically bare, without lobes or modifications of any sort. Claspers simple, rather broad at the base, narrower apically, but with rounded tips; on flexor surface with numerous short curved hairs. Aedeagus a simple, strongly chitinated tube, somewhat broadened at its base.

*Legs* slender, absolutely bare except for a fine, close, erect pubescence on the outer two-thirds of the tibiae. Coxae all small, scarcely longer than the trochanters, the hind pair somewhat stouter than the others. Femora nearly cylindrical, all about equal in length, the front pair a little

Fig. 2.



*Deuterophlebia mirabilis*, gen. et sp. n.

Front (*f*), middle (*m*), and hind (*h*) legs,  $\times 30$ ;  
body in side-view,  $\times 14$ .

stouter than the others. Front tibiae about one-half longer than the femora, very slender on the basal two-fifths, then rather slightly and evenly enlarged to nearly twice the diameter. First segment of front tarsi cylindrical, nearly half as long as the tibia, and almost as long as the three following segments together, the last four segments about equal in length. Middle tibiae one-third longer than the femora, nearly cylindrical, the apical third only considerably enlarged on the flexor surface, extensor surface somewhat concave; tarsal segments bearing the same proportions to the tibia as in the front legs, and therefore shorter than the front tarsi. Hind tibiae resembling the front ones. First

hind tarsal segment not a quarter as long as the tibia and scarcely as long as the two following segments together. The tibiae show no trace of apical spurs. The articulations of the tarsal segments are oblique, and there is a rather extensive membrane between most of the segments. The fifth tarsal segment on all the legs is somewhat enlarged apically, and bears a very large, nearly circular, hairy empodium. There is a single rather long and slender, simple, straight, and pointed claw, the second claw being apparently represented by a minute blunt prominence\*.

*Wings* extremely large for the size of the insect, very broad, with a conspicuous anal lobe. There are no macrotrichia on any part of the surface, not even on the costal margin, but there is a rather long and delicate fringe round the anal lobe, and the whole membrane is covered with short microtrichia. The costal margin is only slightly thickened, and not any darker than the rest of the wing. There are also very slight thickenings of the membrane faintly indicating some of the veins, the most distinct being *Sc* and *R*<sub>1</sub>, the former of these apparently terminating in the latter at about the middle of the length of the wing. More distinct than these vestiges of the true veins is the "secondary venation." This is quite obvious when the wing is in formalin, and on a wing being removed and mounted dry it became so conspicuous as to appear like a true venation. Were it actually so, the insect could hardly be included among the Diptera†. Close examination, however, shows that practically all the lines are produced merely by creases in the wing, there being very little trace of true veins. When a wing is mounted in balsam, the "secondary venation" almost entirely disappears and the traces of true veins referred to above become more apparent. The two photographs given will indicate the arrangement of the vein-vestiges and of the secondary folds. The latter are arranged in a fan-like manner, somewhat suggestive of the hind wing of an earwig. Besides the radiating folds there are three concentric lines across the field of the wing, besides two short transverse lines in the

\* It is just possible that the organ regarded as an empodium represents the second claw. Compare the Blepharocerid genus *Hapalothrix*, in which both claws are large and pulvilliform.

† The only insects which have a venation even faintly resembling this are Mayflies of the genus *Cænis* and allied forms, which also, like our insect, have no mouth-parts or hind wings and even a somewhat similarly shaped head. A cursory examination, however, soon shows that these are the only resemblances between the two groups—the Mayflies, for example, having very differently constructed thorax and legs and no halteres.

middle. It is obvious from the arrangement of the folds that the wing is capable of first folding up fanwise, and then doubling up so as to occupy the smallest possible space. In order to demonstrate this completely I made a paper model of the wing, and obtained the expected result by folding it carefully along the lines of the "secondary venation," commencing from the anal angle. Since there is no hard costal margin (as in the earwig) on which the wing can fold back, it is unlikely that the folding actually takes place after emergence; it is much more probable that, as in the Blepharoceridæ, the "secondary venation" merely marks the manner in which the wing was folded in the pupa. This folding of the imaginal wing within the pupal envelope occurs, so far as I am aware, only in the families Blepharoceridæ and Simuliidæ, and almost certainly indicates a relationship between the new genus and one or both of these families. The very regular arrangement of the folds in the new genus is quite unlike the irregular network found in the Blepharoceridæ, in which family, moreover, the folds generally become very faint when the wing is fully expanded and hardened. The basal sclerites of the wing are very peculiar, the attachment being unlike that found in either of the families mentioned.

*Halteres* with rather slender curved stem and almost globular knob, surface covered with a microscopic pubescence.

*Measurements*.—The following are taken from the formalin specimen, the mounted one is rather smaller:—Antenna, 13 mm. Thorax and abdomen, combined length, 3·7 mm. Width of thorax, 1 mm. Length of wing, 5·6 mm. Greatest breadth of wing, 2·9 mm.

The following are taken from the mounted specimen:—

	<i>Femur.</i>	<i>Tibia.</i>	<i>Tarsus.</i>
Front leg .....	0·75 mm.	1·1 mm.	1·0 mm.
Mid leg .....	0·66 "	0·81 "	0·82 "
Hind leg .....	0·81 "	1·0 "	0·66 "

*Hab.* KASHMIR: Srinagar, 11,000–12,000 ft., July or early August (*F. J. Mitchell*). Cotypes, two males in the British Museum, presented by Mr. M. E. Mosely, Oct. 1921—one dissected and mounted in balsam, the other in formalin, one wing removed and mounted dry. Mr. Mitchell unfortunately kept no notes as to the habits of the flies, but wrote on 25.xi.1921 that "the area in which the collection was made is now probably under 6 ft. of snow, increasing possibly to 20 ft. or 30 ft. in the spring."

While this paper has been passing through the press, Mr. Mitchell has returned to England, and has re-examined the specimens of *Deuterophlebia*. He was able to recall some of the circumstances of their capture, and adds the following note on the exact locality where they were found:—

“These flies were found floating on the edge of Lake Gungabal, which there has a rocky shore. Close to the outlet-stream the lake is 11,700' above sea-level, and lies close under the glaciers of Hurramukh, which rises to nearly 17,000', say 5000' above the surface of the lake. The stream from the lake descends the Wangat Valley, and joins the Sind River, an affluent of the Jhelum.”

# EXPLANATION OF PLATE VI.

*Deuterophlebia mirabilis*, gen. et sp. n., ♂.

- Fig. 1.* Head and bases of antennæ.  $\times 30$ . (Balsam mount.)
- Fig. 2.* Head from beneath, showing mouth-opening.  $\times 80$ .
- Fig. 3.* Base of flagellum of antennæ, showing enlargements on first three segments.  $\times 80$ .
- Fig. 4.* Wing, mounted dry,  $\times 9$ . Showing the regular fan-like arrangement of folds. (Costa slightly folded under towards base.)
- Fig. 5.* Wing, mounted in balsam,  $\times 9$ . Showing traces of true venation. (The apparent distinctness of *Sc* and *R*<sub>1</sub> is partly due to this region not being quite flat.)
- Fig. 6.* Base of wing,  $\times 30$ . Showing sclerites of attachment.
- Fig. 7.* Tip of tarsus,  $\times 180$ . Showing claw and empodium.
- Fig. 8.* Tip of abdomen,  $\times 80$ .

## XLVII.—A Note on some supposed new Species of Earthworms of the Genus *Glyphidrilus*. By J. STEPHENSON, M.B., D.Sc., Lecturer in Zoology, University of Edinburgh.

IN a recent number of this Journal (ser. 9, vol. ix. no. 49, Jan. 1922, pp. 51–68), Mr. C. R. N. Rao, of the University of Mysore, describes four new species of *Glyphidrilus*. As on a former occasion (Rao, Ann. & Mag. Nat. Hist. ser. 9, vol. viii. no. 47, Nov. 1921; Stephenson, Ann. & Mag. Nat. Hist. ser. 9, vol. ix. no. 49, Jan. 1922), the descriptions appeared to me to be mistaken in many points; besides, one of the four species seemed to be identical with *Glyphidrilus annandalei*, Mich., and another probably so, while the two remaining species were obviously immature, and in all likelihood also belonged to *G. annandalei*. I therefore

again asked the authorities of the British Museum to allow me the privilege of examining the types which Prof. Rao had deposited there; these were sent to me, and I owe the authorities of the Museum my best thanks for so kindly acceding to my request.

Prof. Rao begins his paper by giving a list of Indian Glossoscolecidae; this list is erroneous—it includes *Criodrilus bathybates*, Steph., which is not an Indian species (it is recorded only from Japan), and omits *Glyphidrilus papillatus* (Rosa) (Lucknow and Burma). This omission vitiates the diagnostic table on p. 53.

The ovisacs of all four species are stated to be in the same segment as the ovaries; in *G. rarus* the egg-sac is said to be attached to the posterior surface of septum 12/13 along with the ovary. The ovisacs are normally one segment behind the ovaries, and a situation such as that described would be, practically speaking, impossible.

The testes and male funnels of *G. fluviatilis* are also made to occupy an impossible position, and the same is the case with *G. saffronensis*; moreover, in placing these organs where he does, the author contradicts his own generic diagnosis on p. 52. He states that the testes in *G. fluviatilis* are “mostly free,” whatever that may mean; testes are either enclosed in testis-sacs or they are not—in the latter case they are “free.” By “testicular sacs” Prof. Rao means seminal vesicles; there are no testicular sacs in the genus. By “canals” on pp. 54 and 62 the author presumably means grooves.

One of Prof. Rao's species is called in his paper *G. elegans*; the type is said to be in the British Museum. No worm so named was found amongst the specimens received from the Museum; there were, however, two specimens, one labelled “type,” of a worm called *G. splendens*, which is not described in the paper. These correspond pretty well to the description of *G. elegans*, and, as the localities also agree, Prof. Rao seems to have given two names to the same specimens.

I can be brief in the account of my own examination of the worms.

I found none of the abnormal conditions of the genital organs described by Prof. Rao.

*Glyphidrilus fluviatilis* and *G. elegans* or *splendens* are identical with *G. annandalei*, Mich.; I have myself described the dorsal shifting of the fourth and fifth lateral papillae in a paper (“*Oligochaeta* from Manipur, the Laccadive Islands, Mysore, and other Parts of India”) which is appearing in the

'Records of the Indian Museum'; and the oval (instead of circular) shape of the papillæ in *G. elegans*, to which Prof. Rao attaches importance, is due merely to the great contraction of the specimen.

*G. rarus* and *G. saffronensis* are obviously immature; they lack clitellum and papillæ, and have only the faintest trace of the prominent "wings" characteristic of mature specimens of the genus. In *G. rarus* I found only doubtful indications of testes and funnels, no spermathecæ, the ovary small on one side and absent on the other, the ovisac absent on the one side, small on the other, and no female funnels. In *G. saffronensis* I could recognize no testes or funnels, no spermathecæ, no ovisacs or female funnels, though the ovaries were of some size. How Prof. Rao can state, as he does, that "all the numerous specimens in the collection are fully mature and the sexual glands well developed" (*G. rarus*), and that "all the numerous examples in the collection" are "sexually mature" (*G. saffronensis*), I am unable to conceive. From the extent of the just-beginning "wings," which corresponds with that of the other worms, I have no doubt that these specimens also are *G. annandalei*.

A very moderate degree of care, and an elementary knowledge of the group with which he is dealing, would have saved Prof. Rao from most of his mistakes. It is to be regretted that he has published, in this and his previous papers, such erroneous descriptions of material which he destined for the National Collection.

XLVIII.—On the Animals known as "Ground-Hogs" or "Cane-Rats" in Africa. By OLDFIELD THOMAS.

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THE Ground-Hogs or Cane-Rats of Africa present a very considerable uniformity throughout the continent, the common large species, *Thryonomys swinderianus*, extending from the Gambia to the Cape with remarkably little local variation. There would, however, seem to be sufficient differences between the extremes to justify the recognition of several subspecies.

But from these large animals the smaller forms, of which my *T. gregorianus* was the first to be described, differ from

the others by characters of such value that I now think they should be distinguished generically. The new genus might be called *Charomys*, with genotype *C. gregorianus* (*T. gregorianus*, Thos.).

Its skull differs in several important respects from that of *Thryonomys*, the chief being the almost complete absence of the large frontal sinuses present in the latter, and so developed as to produce a totally different shape of the opening that leads from the cerebral to the olfactory fossa of the skull. This opening is narrow below and broad above in *Charomys*, broad below and narrow above in *Thryonomys*, where its upper corners have been compressed by the large frontal sinuses. Owing to this absence of sinuses the frontal area is flat instead of convex, while there is also the difference in the position of the incisive grooves mentioned in the original description of *gregorianus*, and now found to be constant in all the specimens referable to *Charomys*.

A further character seems to be that in *Charomys* there are only two pairs of mammae instead of three, but I cannot say how far this difference is likely to be constant, as only one female *Charomys* is available. Finally, all the known species of *Charomys* have quite a short tail, barely or not exceeding the outstretched hind foot, while in *Thryonomys* the tail is twice this length or more.

In *Charomys* the following subspecies seems to need description:—

*Charomys harrisoni congieus*, subsp. n.

Like true *harrisoni* of the Upper Nile and Lake region, but colour much paler.

General characters, so far as can be judged by the comparison of a female with males, very much as in *harrisoni* and *rutschuricus*, which appear to be rather doubtfully distinct from each other. But the colour is far paler, about as in *sclateri*, the anterior part of the body brown, the hairs tipped with buff, not the grizzled blackish of *harrisoni*. Posteriorly the buffy, which there covers most of the surface, becomes only "pinkish buff," and not the deep ochreous buff of *harrisoni* and *rutschuricus*. Below buffy whitish, the hairs of the inguinal region mostly whitish to the roots.

Skull of the general shape of that of *harrisoni*.

Dimensions of the type:—

Head and body 380 mm.; tail 90; hind foot 59.

Skull: greatest length 82; condylo-incisive length 72.5;







zygomatic breadth 50 ; interorbital breadth 25 ; upper cheek-tooth series 16·5.

*Hab.* Lower Welle River, Congo.

*Type.* Adult male. B.M. no. 7. 7. 8. 192. Original number 64. Collected 2nd November, 1905, by Capt. G. B. Gosling. Presented by the Alexander-Gosling Expedition.

This Cane-Rat is readily distinguishable from *harrisoni* and *nutschuricus* by its much paler colour. Being a female—the only adult female *Chaeromys* in the collection,—any useful comparison with the skulls of other species is impracticable, but the general shape of the skull is as in *C. harrisoni*.

In *Thryonomys* proper there seem to be very few differences, cranial or external, between specimens from the different districts, widely as the whole group ranges.

Originally Temminck's type was young and without locality, so that when, in 1831, a Siena Leone specimen was identified with it by Bennett, that place was rightly accepted as the type-locality, and should be so treated.

From this north-western form I can distinguish, as a subspecies, the common animal of the major part of Africa, from Uganda and the Upper Congo to the Cape, for which a name is available given by Peters solely as a synonym, but with enough description to make it valid. Then the forms of the Lower Niger and Angola may also be subspecifically recognized, making four in all.

These may be briefly diagnosed as follows:—

*Thryonomys swinderianus swinderianus*, Temm.

Temminck, Mon. Mamm. i. p. 245 (1827) ; Bennett, P. Z. S. 1831, p. 111.

Size rather less than in the common form. Colour more drabby brown, with less contrast between body and rump. Skull smaller, with a medium amount of development of the posterior intertemporal gutters.

*Hab.* N.W. Africa, from Gambia to Northern Nigeria.

*Thryonomys swinderianus variegatus*, Peters.

*Aulacodus variegatus*, Peters, Reise Mossamb. p. 138 (1852).

*Aulacodus semipalmatus*, Heugl. N. Act. Ac. Leop. xxxi. p. 5 (1864).

*Aulacodus calamophagus*, de Beerst., Pousarg. Bull. Mus. Paris, 1897, p. 160.

Size largest. Colour very coarsely variegated, the head and fore-back brown, the rump more buffy. Skull large and

heavy, with greatly developed occipital crests. Posterior part of frontal region with deeply notched lateral intertemporal gutters, whose edges are sharply defined in old age.

*Hab.* Central and Southern Africa, from the Bahi-el-Ghazal and Uganda to Eastern Cape Colony.

*Thryonomys swinderianus raptorum*, subsp. n.

Size medium. Colour comparatively dark, strongly variegated, but the rump little more buffy than the rest of the back. Skull rather narrow, and the lateral intertemporal gutters scarcely developed.

External measurements of type:—

Head and body 576 mm.; tail 200; hind foot 88; ear 34.

*Hab.* Forest region of Lower Nigeria and the Gold Coast, extending eastwards through the Congo area. Type from Lagos.

*Type.* Adult male. B.M. no. 20. 3. 18. 39. Original number 4. Collected 19th December, 1919, and presented by Willoughby P. Lowe.

*Thryonomys swinderianus angolæ*, subsp. n.

Smaller. Colour rather more buffy than in *raptorum*.

Skull short and squat. Supraorbital edges nearly parallel, the posterior gutters hardly developed.

External dimensions of type:—

Head and body 500 mm.; tail 195; hind foot 80.

*Hab.* Angola. Type from the junction of the Luando and Cuje Rivers. Alt. 4500'. Another from Ndallo Tando, N. Angola, 2500' (*Ansonge*).

*Type.* Adult male. B.M. no. 20. 4. 27. 2. Original number 1. Collected 30th August, 1919, and presented by Capt. Gilbert Blaine.

Skull-dimensions (all adult males):—

	<i>T. s. swinderianus</i> . Bennett's original specimen from Sierra Leone.	<i>variegatus</i> . Natal.	<i>raptorum</i> . Type.	<i>angolæ</i> . Type.
	mm.	mm.	mm.	mm.
Greatest length . . . . .	94	105.5	99	93
Condylar-incisive length . . . .	81.2	92.3	88.5	83.3
Zygomatic breadth . . . . .	60	70	62	61
Interorbital breadth . . . . .	34.6	41	38	32.2
Intertemporal breadth on gutters.	29.7	30.5	37.5	31.7
Upper cheek-teeth . . . . .	19.5	19.2	19.7	19.6

X.—On new Species of *Alcides* from the Oriental Region. By GUY A. K. MARSHALL, C.M.G., D.Sc.

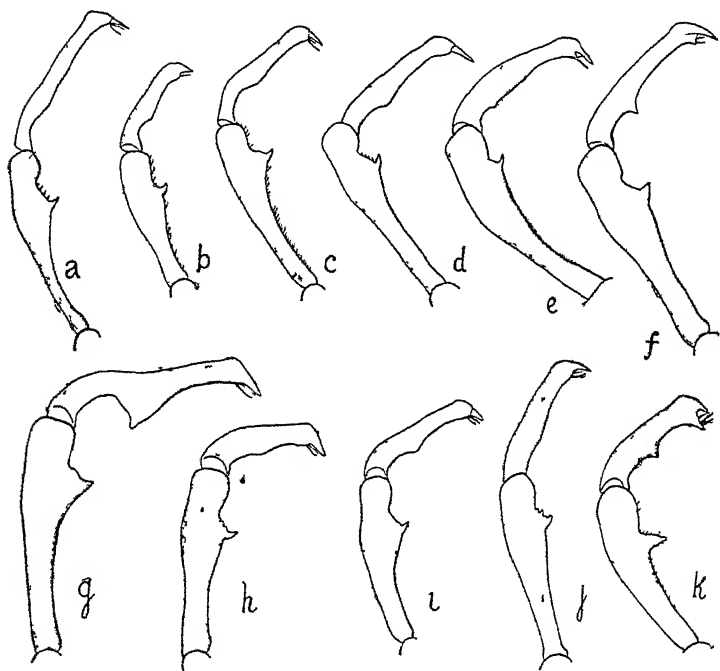
[Plate VII.]

*Alcides crinalifer*, sp. n. (Pl. VII. fig. 1.)

♂ ♀. Integument black, clothed above (between the shiny granules) with small, narrow, non-contiguous, fawn-coloured scales that are somewhat fimbriate at the apex, and with the following creamy-white markings, that are formed of dense, overlapping, broad, plumose scales: a median stripe on the base of the rostrum and covering the whole forehead; three stripes on the pronotum, the median being a little narrower than the laterals; the elytra with a broad stripe continuous with the lateral one on the prothorax, commencing on intervals 5 and 6 at the base, but soon passing on to intervals 6, 7, and half of 8, and so continuing to the apex; a stripe starting just behind the scutellum, running for a short distance along interval 1, and turning obliquely outwards to join the lateral stripe before the middle; and, finally, a stripe starting on the suture behind the middle, running obliquely to interval 3, and continuing straight along that interval to the apex; the lower surface with dense, fawn-coloured, plumose scales, which are more sparse in the middle of the metasternum and venter, the last ventrite being mainly bare.

*Head* with close shallow punctuation on the vertex, the forehead with a broad, shallow, punctate depression, which is filled up with scaling. *Rostrum* shorter than the front femur in both sexes, feebly curved, slightly dilated at the apex, coarsely punctate as far as the antennæ (slightly less so in ♀ than in ♂), and with a shallow, median, longitudinal impression in the basal half, filled with scaling. *Prothorax* transverse, broadest at the base, and narrowing rather rapidly at the apex, with the sides gently rounded and shallowly constricted at the apex; the postocular lobes well developed; the dorsum with fairly large, separated, low, shining granules, except on the three pale stripes, the lower lateral margin of the granulate area sharply defined. *Scutellum* not enclosed, transverse, bare, either flattened, shallowly impressed, or with a very deep impression. *Elytra* very elongate-ovate, broader than the prothorax at the shoulders, which are very sloping, and thence gradually narrowed to the apices, which are slightly deluscent; the basal lobes

much less prominent than usual, the basal margin being almost transverse from interval 4 to the shoulder; the dorsal outline convex, forming a regular curve with its highest point at the middle, the posterior declivity having an average slope of  $45^{\circ}$ , the shallow striæ containing small, deep, separated punctures, each containing a minute horizontal seta, where not obliterated by the dense scaling; intervals 1-9



Front femur and tibia of (a) *Alcides crinalifer*, sp. n., (b) *A. habenatus*, sp. n., (c) *A. loratus*, sp. n., (d) *A. pyrrhus*, sp. n., (e) *A. jugalis*, sp. n., (f) *A. stercoratus*, sp. n., (g) *A. subsclatus*, sp. n., (h) *A. arcicollis*, sp. n., (i) *A. bryanti*, sp. n., (j) *A. trigonophorus*, sp. n., (k) *A. vitalis*, sp. n.

slightly convex, and each with a rather irregular and often duplicated row of closely-set, low, shining granules, except along the stripes of dense white scaling; interval 10 with only a few granules on a line with the metasternum, and again at the apex. Legs red-brown, with the apices of the femora and the tarsi blackish, and set with sparse narrow scales; all the femora with a sharp tooth and a row of

four small teeth in front of it (fig. 1, *a*); the tibiæ simple internally.

*Length* 8·5–10 mm., *breadth* 3·5–4 mm.

MADRAS: Ouchterlony Valley, 4500 ft., Nilgiri Hills (*H. L. Andrewes*); Ootacamund.

Described from four specimens.

Most nearly allied structurally to *A. acutus*, Fst., but with markings suggestive of the group represented by *A. tæniatus*, Hllr., and *A. vinculosus*, Hllr.; the pattern is, however, quite distinctive, especially the broad continuous stripe on intervals 6 and 7 and the hairpin-like marking on the declivity.

*Alcides habenatus*, sp. n. (Pl. VII. fig. 2.)

♂ ♀. Form elliptical: integument black, with stripes and bands formed of dense, creamy-white, plumose scales; the prothorax with a narrow median stripe and a broader bilateral stripe, ending on the base opposite intervals 5 and 6 of the elytra, and below this an ill-defined broad stripe on the pleuræ; the elytra thinly clothed with short brown setæ and with the following pale markings: a broad curved intra-humeral stripe, starting at the base on intervals 5 and 6, turning outwards just behind the shoulder on to intervals 7–10 and ceasing a little before the middle, its inner edge forming a regular curve or with a more or less distinct re-entrant angle; a broad oblique band (of varying width) starting at the middle of interval 2 and sloping backwards to join the proximal end of a broad lateral stripe that occupies more than the apical third of intervals 7–9; and, finally, a stripe on the apical fourth of interval 3; the lower surface fairly densely covered with buff plumose scales.

*Head* with close shallow punctation and without a frontal fovea. *Rostrum* moderately stout, as long as the front femur in ♀, shorter in ♂, a little narrower in the basal than in the apical half, and with the antennæ inserted far beyond the middle in both sexes; the dorsal outline shallow sinuate in the basal half, the punctation fairly strong and close in ♂, and but little finer in ♀. *Prothorax* a little broader than long, subconical, widest at the base, regularly narrowing in front, with the sides gently rounded and the subapical constriction shallow; the apical margin subtruncate dorsally; the longitudinal outline flat behind and gently sloping in front; the dorsum closely set throughout with low rounded granules, which are very much reduced on the apical area. *Scutellum* punctiform, bare. *Elytra* elongate-ovate, distinctly

broader at the shoulders than the prothorax, the basal lobes not very strongly produced, the apices jointly rounded; the striae with comparatively small shallow punctures and not deeper or noticeably curved at the base; the intervals with irregular low granules, which are more numerous on the basal half and absent from the squamose areas, the darker areas with numerous short, recumbent, pale setae; a very shallow curved impression just behind the scutellum. *Legs* comparatively short, shallowly punctate, and rather thinly covered with linear scales; the femora with a short simple tooth almost hidden by setae; the tibiae almost straight on the outer edge, the front pair not toothed on the inner edge and only faintly bisinuate (fig. 1, *b*).

*Length* 6.5–8 mm., *breadth* 3–3.5 mm.

MADRAS: Kodaikanal (*T. V. Campbell*, type); Palni Hills, 6000 ft. (*P. B. Nathan*).

Described from ten specimens.

Closely resembles *A. audax*, Heller, in general facies, but in that species the humeral stripe on the elytra is replaced by a subhumeral spot, the oblique posterior stripes meet on the suture in front of the middle and do not extend along the lateral margin to the apex, and the non-squamose areas of the elytra bear only sparse inconspicuous dark setae.

*Alcides trigonophorus*, sp. n. (Pl. VII. fig. 10.)

♂ ♀. Form subelliptical; integument black, thinly clothed with short, recumbent, brown setae and marked with narrow pale lines formed of whitish scales that are narrowly bifid or trifid to the base; the prothorax with five sharply defined pale stripes, the upper lateral one terminating at the base opposite the shoulder of the elytron, the lower lying below the level of the lateral margin of the elytron; the elytra with a subtriangular marking formed by a narrow oblique line on each, running from the base of stria 1 to behind the middle on interval 9, and there connected together by a post-median curved line of the same width; a pale line on interval 9 from the base to one-third the length and another at the apex of interval 3; the lower surface clothed with numerous brown plumose scales.

*Head* with shallow confluent punctation and narrow split scales, the forehead transversely impressed. *Rostrum* long and slender, slightly widened at the insertion of the antennae (beyond the middle in both sexes) and again at the apex, rather strongly punctate throughout (except at the extreme apex in the ♀), but the punctures on the posterior part



closer and longitudinally confluent, there being a low median carina which sometimes extends beyond the antennæ; the punctures in the ♂ markedly coarser than in the ♀. *Antennæ* slender, the scape nearly as long as the funicle and club together; the funicle with joint 2 as long as but more slender than 1, 3 longer than 4, 4 to 6 equal in length and longer than broad, 7 more separated from the club than usual and only as long as its basal joint. *Prothorax* rather transverse, subconical, broadest at the base and rapidly narrowing in front, the sides feebly rounded and with a distinct subapical constriction; the dorsal apical margin truncate, the post-ocular lobes feeble, and the dorsal outline only slightly convex; the dorsum with shallow rugulose punctures, many of the interspaces forming irregular granule-like elevations, which are coriaceous and opaque. *Scutellum* very small, punctiform, not enclosed in front. *Elytra* oblong-ovate, a little broader at the shoulders than the prothorax, obtusely rounded at the apex, and with a shallow transverse impression near the base; the striæ deeper at the base and apex, elsewhere containing large oblong punctures; the intervals rather broader than the striæ, very finely and transversely rugulose. *Legs* (fig. 1, *j*) moderately long and slender, rugosely punctate, clothed with short brown setæ and narrow split scales; the femora less clavate than usual, with a long sharp tooth, followed by two or three denticulations; the front tibiæ feebly curved externally and shallowly bisinuate within, the posterior pair simple. *Sternum* with the front intercoxal space only one-third as wide as the median one; the metasternum coriaceous, feebly and transversely granulose.

*Length* 8.5–9.5 mm, *breadth* 3.25–3.75 mm.

INDIA: Manipur, Assam (*Doherty*).

Described from six specimens.

In general form, structure, and size very similar to *A. scenicus*, Fst., but readily distinguished from this and all its other allies by the very distinctive pattern, which strikingly resembles that of a structurally very different species, *A. ligatus*, Pasc.

*Alcides loratus*, sp. n. (Pl. VII. fig. 3.)

♂ ♀. Form subcylindrical; integument black, with stripes and bands composed of pale, narrow, plumose scales dusted with pale yellow powdering; the forehead and base of the rostrum with thin powdering; the pronotum with a narrow median stripe from the base to beyond the middle, and a

broad bilateral stripe extending obliquely from the front margin to the basal angle below the shoulder of the elytra; the elytra with a slightly oblique dorsal stripe from the base to about one-third the length, starting at the base on intervals 2 and 3 and ending on intervals 3-5; behind the middle a complete broad transverse band gradually widening outwardly and curving forwards at the sides, being usually continued as a narrow stripe along interval 8 to the base; and, finally, a broad V-shaped mark at the apex on intervals 3 and 7-9, not uniting with the transverse band; the lower surface with dense pale scaling and yellow dusting throughout.

*Head* coriaceous on the vertex, the forehead sparsely punctate and with a shallow median fovea. *Rostrum* only a little longer in ♀ than in ♂, strongly deflexed, slightly curved distally, cylindrical as far as the antennæ and very little wider beyond; in the ♂ closely and fairly strongly punctured throughout, with a short smooth median line between the antennæ, and the submentum with a downwardly projecting tooth; in the ♀ the punctures rather smaller and separated. *Antennæ* inserted well beyond the middle in both sexes, the scape longer than the funicle; joint 2 of the funicle as long as but much more slender than 1, 3 to 5 equal and as long as or a little longer than broad, 6 wider and longer than broad, 7 as long as the first two joints of the club. *Prothorax* widest at the base, subconical, the sides gently rounded and distinctly constricted near the apex; the anterior dorsal margin feebly rounded, the postocular lobes distinct and heavily fringed; the dorsal outline sloping gently near the apex and plane behind; the dorsum closely set with somewhat depressed, forwardly directed, and pointed granules, each bearing a recumbent seta, but the apical area only with sparse shallow punctures. *Scutellum* not enclosed, subcircular or slightly transverse, bare, smooth, plane or with a more or less distinct median depression. *Elytra* subcylindrical, a trifle broader than the base of the prothorax, the basal lobes not very strongly produced, and the apices separately rounded; the striæ containing large deep punctures as far as the postmedian band, beyond which the punctures disappear, striæ 4 and 5 being deeper at the base and curved outwards; the intervals even, rugulose, and sometimes indistinctly granulate, the non-squamosa parts fairly densely clothed with short curved setæ and thinly covered with yellow or reddish powdering; a broad deep impression behind the scutellum, the pre-apical impression shallow. *Legs* (fig. 1, c) rather elongate, rugulose; the

femora rather densely clothed with plumose scales and bearing a broad simple tooth; except the middle pair, which has a minute additional tooth; the tibiæ setose, the outer edge strongly curved near the base in the anterior pairs, the front pair carinate on the inner edge and with a deep basal sinuation. *Sternum* with the space between the coxæ practically the same in all three pairs; the metasternum finely rugulose, not granulate.

*Length* 7·75–8·5 mm., *breadth* 2·5–3 mm.

MADRAS: Palni Hills, 6000 ft., v. 1917 (*P. B. Nathan*, type); Kodaikanal (*T. V. Campbell*); Munaar, Travancore.

Described from seven specimens.

Like an enlarged *A. vafellus*, Fst., which it resembles almost exactly in pattern, except that in that species the transverse band on the elytra, when viewed laterally, slopes more obliquely forwards; further, the punctuation of the elytra is much coarser, the prothorax is much less abruptly constricted in front, and the front tibiæ are only shallowly sinuate at the base in *A. vafellus*.

*Alcides pyrifer*, sp. n. (Pl. VII. fig. 4.)

♂. Form suboblong; integument piceous black, with pale markings formed of very small, fringed, overlapping, creamy-white scales; on the pronotum and elytra is a large pear-shaped area of the ground-colour surrounded by a line of white scaling, which starts on the front margin of the pronotum, continues on to the base of interval 5 of the elytra, almost immediately passes to 6, then at one-third the length to 7, continues on this to beyond the middle, and then curves transversely inwards to the suture, being there narrowly separated from the corresponding line on the other side; a little behind the middle on interval 8 a short line of scaling contiguous with the stripe and a similar, rather longer one on interval 9; a V-shaped white marking at the apex of intervals 3 and 9; the pronotum with a faint, narrow, median, pale line in the basal third and a sharply defined lateral stripe on a line with interval 10 of the elytra; the lower surface with fairly dense, buff, fringed scales, the metanotum with a large lateral patch of much denser silvery-white scaling.

*Head* with rather coarse confluent punctuation, leaving two small, transverse, smooth patches on a line with the upper edge of the eye; the forehead with a faint transverse impression at its junction with the rostrum and with an inconspicuous median fovea. *Rostrum* elongate, gently

curved, cylindrical to the insertion of the antennæ, and thence slightly dilated to the apex; very coarsely and closely punctate almost to the extreme apex, each puncture containing a scale that is fringed at the apex. *Antennæ* with the scape only as long as the first six joints of the funicle, of which joint 1 is a little shorter than 2+3, 3 to 6 are transverse, and 7 is very long, as long as the  $2\frac{1}{2}$  preceding joints and more than twice as long as the club, which is much contracted. *Prothorax* much broader than long, subparallel-sided from the base to the middle, thence strongly and roundly narrowed, with a well-marked subapical constriction; the dorsal apical margin rounded, the longitudinal outline gently convex and sloping upwards anteriorly in relation to the long axis of the body; the dorsum evenly set with well-separated, flat, shining granules, the apical area closely punctate. *Scutellum* not enclosed, transverse, bare, and shallowly punctate. *Elytra* cylindrical, distinctly wider at the shoulders than the prothorax, broadly rounded behind, and with a curved transverse impression behind the scutellum; the shallow striæ with large quadrate punctures (each containing a minute granule on either side) as far as the transverse band, behind which the striæ are deeper and the punctures much reduced, the striæ not being noticeably deepened at the base; the intervals about as broad as the striæ, smooth or finely aciculate, with fairly numerous minute granules on the apical area and at the extreme base, there being also single granules on the anterior slope of each puncture. *Legs* (fig. 1, *d*) moderately long and slender, coarsely punctate, with a scale in each puncture; the femora with a very sharp curved tooth and a feebly denticulate ridge in front of it; the front tibiæ only gently curved externally, strongly bisinuate internally, and with an obtuse tooth behind the middle, the posterior pairs simple and scarcely bisinuate internally. *Sternum* with the front intercoxal space narrower than the median one; the sculpturing of the metasternum concealed by the scaling.

*Length* 9–10 mm., *breadth* 3.5–4 mm.

SARAWAK: Mt. Matang, ii. 1914, Quop, iii. 1914, Rctuh, v. 1914 (*G. F. Bryant*).

Described from five specimens.

*Alcides pyriifer hemicyclus*, subsp. n.

♂. Differs from the typical form in the following characters: The elytral stripe broadly interrupted on each side behind the shoulder, the marking behind being therefore

shaped like a horse-shoe; moreover, the contiguous stripes on intervals 8 and 9, instead of being much shorter than that on 7, are nearly or quite as long; and there is no trace of the median stripe on the pronotum. The sides of the prothorax are not parallel in the basal half, but distinctly convergent in front.

Length 9.5–10.5 mm., breadth 3.75–4 mm.

S.E. BORNEO: Pengaron (*Doherty*).

Described from four specimens.

*Alcides jugalis*, sp. n. (Pl. VII. fig. 5.)

♂ ♀. Form subcylindrical; integument black, with pale markings formed of small, short, whitish, plumose scales dusted with ochreous powdering; the pronotum with three stripes, the median one much narrower than the laterals, and all reaching the apex; the elytra with a broad sutural stripe on intervals 1 and 2 from the base almost to the middle; a narrow, shorter, and rather oblique stripe starting at the base on interval 6 and ending on interval 4; a broad, complete, common, transverse band behind the middle, which widens and curves forwards at the sides, being continued to the base as a narrow stripe along interval 10; and a subtriangular apical patch covering all the declivity except interval 11; the lower surface fairly densely covered with plumose scales and ochreous powdering, which are thinner down the middle of the metasternum and abdomen.

*Head* unusually broad, longitudinally rugulose, and without any median fovea. *Rostrum* stout, subcylindrical, almost straight, slightly narrowing from the base to the middle, and feebly widening again at the apex, of about equal length in the two sexes, coarsely punctate and longitudinally striolate at the base, and with a broad deep furrow on each side between the eye and antenna; the punctures strong and close throughout in the ♂, almost as strong on the basal half in the ♀, but much finer apically. *Antennæ* inserted beyond the middle in both sexes, the scape a little shorter than the funicle, of which joint 1 is longer than 2 and 3, 3 to 6 are bead-like and transverse, and 7 is much shorter than the club. *Prothorax* a little shorter than its basal width, subconical, gradually narrowed from base to apex, with the sides only slightly rounded and the subapical constriction feeble; the dorsal apical margin rounded, the longitudinal outline almost flat, but the whole prothorax tilted upwards in front; the dorsum set throughout with small separated granules, those on the discal area each

bearing an opaque patch, the remainder shiny, and the apical area coriaceous dorsally and rugosely punctate at the sides. *Scutellum* small, ovate, bare, and entirely enclosed in front. *Elytra* subcylindrical, hardly broader than the prothorax at the shoulders, very slightly widening behind and broadest not far from the apex, which is very broadly rounded, and with a shallow transverse impression close to the base; the broad deep striæ containing large quadrate foveæ, and becoming much shallower on the declivity; the intervals much narrower than the striæ, subcostate, shiny, rugulose, and the dorsal ones subgranulate towards the base; the setæ on the non-squamose area extremely minute. *Legs* (fig. 1, *e*) moderately long, rugosely punctate, and thinly clothed with linear scales; the femora with a small, sharp, simple tooth; the front tibiæ much compressed, very broad in the basal half, and rapidly narrowing towards the apex, the outer edge gently and evenly curved, the inner edge almost straight and with a very small sharp tooth not far from the base, and the posterior pairs simple; the front coxæ of the ♂ with a laminate tubercle. *Sternum* with the front coxæ almost as widely separated as the middle pair; the metasternum smooth and with a few sparse granules.

*Length* 12–13 mm., *breadth* 4.5–4.75 mm.

MALAY PENINSULA: Kinta Valley, S. Perak (*H. N. Ridley*, type); Ligor (*Castelnau*).

Described from a pair.

Allied to *A. sellatus*, Fst., but that species is much smaller and has a very deep depression at the base of the elytra; the stripe on the basal third of intervals 5 and 6 is united externally with the lateral stripe; the front tibiæ are armed with a strong sharp tooth at the middle of the internal edge, etc.

*Alcides subsellatus*, sp. n. (Pl. VII. fig. 7.)

♂ ♀. Forms subcylindrical; integument black, with sharply defined creamy-white stripes and bands; the head and the rostrum (in ♂ only) with thin pale scaling; the pronotum with three pale stripes which do not quite reach the apex; the elytra each with an oblique stripe starting at the base just in front of the scutellum and ending at the middle on stria 4, and another lateral stripe starting at the base on intervals 6 and 7 (and including the extreme base of 5) for one-fourth the length, then passing for a short distance to intervals 7 and 8, then widening to cover intervals 6–9, and, finally, merging into a broad, well-defined, transverse band

that extends right across the elytra; the dark dorsal areas densely clothed with curled black scales, except at the apex where there are sparse, pale buff, setiform scales; the basal third of the lateral area, including the shoulders, quite bare and shiny; the lower surface fairly closely covered with pale buff plumose scales, except on the sides of the metasternum, which are very densely clothed with a silky patch of silvery-white hairs.

*Head* with confluent punctation and a shallow median fovea; a short median carina about the fovea in the ♂ only. *Rostrum* very long, longer than the head and prothorax, of equal length in the two sexes, and gently curved; in the ♂ the dorsum markedly flattened from the base to the antennæ, with a sharp median carina terminating at an inter-antennal fovea, an undulating lateral carina at the edge of the flattened area, and a less distinct one just within, the apical area convex and closely punctate, and the submentum with a downwardly projecting tooth; in the ♀ not flattened above, with confluent punctation in the basal half, a broad, low, smooth, median carina and a very narrow lateral one on each side, the apical area sparsely punctate and shiny. *Antennæ* inserted at the middle of the rostrum in the ♀ and a little beyond it in the ♂; the scape as long as the funicle; joint 1 of the funicle as long as 2+3, 4 to 6 bead-like and slightly transverse, 7 as long as the two basal joints of the club. *Prothorax* broader than long, parallel-sided from the base to the middle, then rapidly narrowing to the apex and with a shallow subapical constriction; the apical margin truncate dorsally, the dorsal outline slightly convex, the whole prothorax being tilted upwards anteriorly in relation to the long axis of the body; the dorsum throughout with separated and much flattened granules, except the apical area, which is closely and shallowly punctate. *Scutellum* small, not enclosed in front, pyriform, broadest behind, bare and usually with a shallow median impression. *Elytra* cylindrical, not broader than the thorax, with a broad, shallow, transverse impression at the base, and broadly rounded behind; the stræ shallow and with coarse punctures (mainly hidden by the scaling), but becoming much deeper and with much reduced punctures on the declivity; the intervals even, rugosely punctate, 4 and 5 being subgranulate towards the base. *Legs* (fig. 1, *g*) elongate, shallowly punctate, and rather thinly clothed with linear scales; the front femora with a broad triangular tooth, the front edge of which is obscurely denticulate, the teeth on the two posterior pairs progressively smaller; the front tibiæ very

strongly curved at one-third from the base, the outer margin sinuate in the apical half, the inner margin with a very large laminate tooth, the posterior edge of which is broadly flattened, the posterior tibiæ simple; the front coxæ obtusely tuberculate in the ♂. *Sternum* with the space between the front coxæ as broad as that between the middle pair.

*Length* 8.75–11 mm., *breadth* 3.25–4 mm.

SUMATRA: Merang ( *W. Doherty* ).

Described from six specimens.

Most nearly allied to *A. sellatus*, Fst., a narrower species, which has a common broad sutural stripe on the basal third and the dark area surrounding it is much dilated behind (parallel-sided in *subsellatus*); the prothorax is as long as broad and a little narrower than the elytra; the saddle-like basal depression on the elytra is much deeper; the 7th joint of the funicle is longer than the club, etc.

*Alcides arcicollis*, sp. n. (Pl. VII. fig. 8.)

♂. Form subcylindrical; integument black, with pale markings formed of broad plumose scales covered with yellow powdering; the pronotum with a median stripe which is broad in the basal half and rapidly narrows in front, reaching only the subapical constriction, and the broader lateral stripes more oblique than usual and curving inwards in front so as to unite before reaching the apex, thus forming a regular arch; the elytra with a sutural stripe from the base to the middle, which in its basal half covers the space from the suture to stria 2, but in the apical half the inner edge gradually diverges outwards, leaving interval 1 bare; another rather shorter, narrower, and oblique stripe starting at the base on interval 6 and ending on interval 5; a broad postmedian band, curving forwards (but not widening) at the sides, reaching the lateral margin at about the middle, and continuing to the base as a stripe covering the space between striae 9 and 10 inclusive, and no apical patch; the lower surface rather densely clothed with plumose scales and yellow powder.

*Head* closely and strongly punctate, with a small frontal fovea and with an impressed line round the upper edge of each eye. *Rostrum* elongate, cylindrical, slightly dilated at the apex, gently curved, and with a downwardly projecting tooth on the submentum; with coarse, longitudinally confluent punctation from the base to the antennæ, which are inserted well beyond the middle, the apical area shiny and



sparsely punctate. *Antennæ* with the scape as long as the whole funicle, which has joint 1 a little shorter than 2+3, 3 to 6 bead-like and transverse, and 7 as long as the two basal joints of the club. *Prothorax* slightly broader than long, parallel-sided from the base to the middle, then roundly narrowed and with the subapical constriction rather shallow; the dorsal anterior margin slightly rounded, the longitudinal outline feebly curved and sloping upwards from the base; the dorsum fairly closely set with markedly flattened granules. *Scutellum* punctiform, glabrous, almost enclosed in front. *Elytra* cylindrical, not broader than the prothorax, broadly rounded behind, and with a shallow transverse impression at the base; the deep striæ containing large oblong foveæ, which are reduced behind the post-median band, so that the striæ appear deeper there, but not deepened at the base; the intervals rather narrower than the striæ, subcostate, rugosely punctate, and with small setiform scales, which are sparse in the basal half and much denser at the apex. *Legs* (fig. 1, *h*) relatively short and stout, thinly clothed with short recumbent setæ; the anterior pairs of femora with an elongate vertical tooth and two indistinct denticulations in front of it, the hind pair with a small simple tooth; the front tibiæ broad, narrowing to the apex, the inner edge not toothed and very feebly bisinuate, the posterior pairs simple; the front coxæ not tuberculate. *Sternum* with the front intercoxal space very nearly as wide as the median one; the metasternum sparsely granulate towards the sides.

*Length* 9.5–10.5 mm., *breadth* 3.5–3.6 mm.

JAVA: Depok, iv. 1909 (*G. E. Bryant*).

Described from two males.

Very closely allied to *A. jugalis*, sp. n., but the elytra are more parallel-sided, and the prothorax less conical and more abruptly narrowed in front; the lateral stripes on the pronotum unite anteriorly before reaching the front margin; the sutural stripe on the elytra is furcate posteriorly, etc.

*Alcides stevensi*, sp. n. (Pl. VII. fig. 6.)

♂ ♀. Integument black or piceous black, not very densely clothed with small pale scales, and more or less dusted with rust-red powder.

*Head* closely punctate, the forehead with a shallow median fovea. *Rostum* a little shorter than the front femur in both sexes, nearly straight but strongly deflected, and gradually widened at the apex; strongly and closely punctate throughout in the ♂, and with the punctures in the basal half more

or less confluent longitudinally; in the ♀ a little longer and with the punctation much finer. *Prothorax* rather broader than long, subparallel-sided for a short distance from the base, then roundly narrowed and strongly constricted at the apex; the apical margin narrowly lobate in the middle dorsally, the postocular lobes well marked; the dorsal outline gently convex longitudinally, deepest in the middle; the dorsum with dense, low, rounded granules, each with a short recumbent seta on its anterior edge, the interstices thinly clothed with setiform scales; there is a trace of a shallow median stria, terminating in a deep impression on the basal lobe. *Scutellum* not enclosed, somewhat pyriform, with a few minute scales, and sometimes with a shallow median impression. *Elytra* subcylindrical, distinctly broader than the prothorax, with rounded shoulders and with a shallow, curved, transverse impression just behind the scutellum; the striae with deep quadrate punctures, each containing a minute horizontal seta, but most of them more or less filled up with scaling or powdering, striae 3-5 deeper at the base and curving outwards; the intervals broader than the striae, plane, and closely punctate or finely rugulose, 2-5 more or less granulate towards the base; the scales small, oblong, fringed at the apex and somewhat curved. *Legs* (fig. 1, *f*) dark piceous, sparsely clothed with similar but larger scales; the femora with coarse confluent punctation and armed with a stout simple tooth; the tibiae reticulately punctate, with a sharp tooth on the inner edge above the middle (reduced to a mere angulation on the hind pair) and another near the apex.

*Length* 12-13 mm., *breadth* 5.25-5.5 mm.

ASSAM: Silonibari, N. Lakhimpur, v.-vii. 1911 (*H. Stevens*).

Described from four specimens.

Like a very large specimen of *A. improvidus*, Fst., but without any pale markings; in the latter species the shoulders of the elytra are less prominent, the intervals are much narrower than the striae, more rugulose, and very sparsely punctate.

*Alcides gmelinae*, sp. n.

♂ ♀. Integument black, or the head and thorax black and the elytra and legs red-brown; the elytra with a narrow, ill-defined, pale band across the top of the declivity composed of narrow feather-scales, and a still less distinct stripe of similar sparser scales running from behind the scutellum towards the middle of the lateral margin.

*Head* with close reticulate punctation throughout in ♂, with any frontal fovea; ♀ with the forehead more sparsely punctate. *Rostrum* of ♂ shorter than the front femur, only slightly curved, parallel-sided from the base to the insertion of the antennæ (a little beyond the middle), thence gradually widening to the apex, closely and strongly punctate throughout, with a short median stria between the antennæ, and with a downwardly projecting tooth on the submentum; rostrum of ♀ also shorter than the front femur (scarcely longer than that of the ♂) and with the antennæ inserted a little beyond the middle, the apex less dilated than in the ♂, but the punctures nearly as dense and strong. *Prothorax* nearly as long as broad, parallel-sided for a short distance from the base, then roundly narrowed, and broadly constricted at the apex; the postocular lobes rather feeble; the dorsum closely set throughout with flattened scale-like granules, with fairly numerous feather-scales at the sides and a few down the middle line, the rest of the disk with sparse recumbent setæ. *Scutellum* not enclosed in front, quadrate. *Elytra* cylindrical, only slightly broader than the prothorax, with a very shallow transverse impression near the base; the foveolæ deep and oblong, becoming striate beyond the transverse pale band; the intervals rugulose, with sparse, minute, recumbent setæ. *Legs* with numerous narrow feather-scales; the anterior pairs of femora with a prominent bidentate tooth, that on the hind pair much reduced; the front tibiæ with a laminate angulation internally about the middle and with a very small apical tooth near the uncus, the posterior pairs simple.

*Length* 6.25–7.5 mm., *breadth* 2.25–3 mm.

UNITED PROVINCES: Dehra Dun, on grass, 1 ♀, 15. vii. 1912; Dehra Dun, boring in twigs of *Gmelina arborea*, 1 ♂, 1 ♀, vii. and ix. 1914 (*C. F. C. Beeson*). ASSAM; Cachar, bred from *Gmelina arborea*, 1 ♂, 10. viii. 1920. BURMA: Bilumyo R., Katha, 1 ♂, 13. v. 1919 (*Beeson*).

Very closely allied to *A. ludificator*, Fst. (Ann. Mus. Civ. Genova, xxxiv. 1894, p. 254), but the ♂ of that species may be at once distinguished by the absence of the tooth on the submentum; and in the ♀ the rostrum is longer than the front femur and very finely and sparsely punctate.

*Alcides bryanti*, sp. n. (Pl. VII. fig. 9.)

♂ ♀. Form elliptical; integument piceous or blackish, with pale stripes and bands formed of small subquadrate, overlapping, fringed, creamy-white scales; a narrow stripe

starting from the front margin of the pronotum on a line with the inner edge of the eye, running on to the elytra on the base of interval 5, almost immediately passing to 6 and continuing on it for one-third the length, then passing to 7 and there continued to the apex, though sometimes more or less broadly interrupted behind the middle; at about one-third from the base the longitudinal stripe emits a transverse band of the same width reaching almost to the suture and sloping slightly backwards, and at two-thirds the length a similar but much more oblique, and therefore longer, band; between these bands, but on the outer side of the stripe, two short, variable, and often irregular bands usually reaching stria 9; stria 1 with a row of pale dots on the declivity, each formed of about four scales (often abraded); the prothorax with a sharply-defined, narrow, lateral stripe extending from the postocular lobe to the basal constriction on a line with stria 10; the lower surface fairly densely clothed with small pale scales and buff powdering.

*Head* with close shallow punctation, the forehead with a transverse depression covered with dense scaling. *Rostrum* elongate, cylindrical, scarcely widened at the apex, feebly curved, coarsely punctate, and dorsally bicarinate as far as the antennæ, each of the punctures containing a scale, and the apical area with small sparse punctures; in the ♀ as long as but distinctly more slender than in the ♂, but the punctation only very slightly finer. *Antennæ* inserted a little beyond the middle in both sexes, the scape as long as the funicle, of which joint 1 is shorter than 2+3, 3 to 6 are transverse, and 7 is about as long as the club. *Prothorax* rather broader than long, rounded at the sides, widest behind the middle, constricted at the base and more strongly so in front; the dorsal apical margin gently rounded, the longitudinal outline feebly convex; the dorsum evenly set with low granules, the apical area shallowly punctate. *Scutellum* not enclosed, small, transverse, smooth, and bare. *Elytra* subcylindrical, a little broader at the shoulders than the base of the prothorax, obtusely acuminate behind, and with a strong transverse basal impression; the shallow striae with large quadrate punctures as far as the posterior band, behind which the striae are deeper and the punctures much smaller and shallower, the punctures without scales or granules: the intervals narrower than the striae, subcostate, with small indistinct granules, which are more numerous at the base, and with microscopic setæ. *Legs* (fig. 1, i) rather long and slender, with coarse shallow punctures, each of which contains a scale; the femora with a sharp simple

tooth; the front tibiae gently curved externally, strongly bisinuate internally and with an obtuse-angled tooth behind the middle, the median pair very feebly bisinuate within, the hind pair short and simple. *Sternum* with the front intercoxal space much narrower than the median one; the metasternum sparsely granulate.

*Length* 8-9½ mm., *breadth* 2.5-3.25 mm.

SARAWAK: Mt. Matang, i. 1914, Quop, iii. 1914 (type), Puak, v. 1914 (*G. E. Bryant*).

Described from six specimens.

Structurally this species belongs to the group represented by *A. chiliarchus*, Boh., and *A. ligatus*, Pasc., but may readily be recognised by its very distinctive pattern; the internal tooth on the front tibiae is not so strongly developed as in the two species mentioned.

*Alcides vitalisi*, sp. n. (Pl. VII. fig. 11.)

♂ ♀. Body markedly flattened, as though adapted for subcortical habits; integument dark piceous, the head, prothorax, and the humeral angles of the elytra black; the pale scales on the prothorax forming only a faint median line, and fairly numerous on the pleuræ; the elytra with a broad transverse band of rather sparse, pale plumose scales behind the middle, extending from the lateral margin to stria 3 or 2, its anterior edge with a long projection on interval 5 and the hind margin angulate on interval 6; in addition, an indefinite preapical band of scales, which is broadly interrupted on the suture.

*Head* closely and coarsely punctate, the forehead flattened but without any median fovea. *Rostrum* unusually slender (especially in the ♀), straight, quite cylindrical, and almost porrect; in the ♀, longer, with the antennæ inserted far behind the middle, coarsely punctate in the basal third only, the distal portion being glabrous with extremely minute sparse punctures, the dorsal outline rising sharply (about 30°) near the junction with the head, the actual base being somewhat above the level of the forehead; in the ♂ shorter, with the antennæ at the middle, coarsely and confluent punctate to beyond the middle and with three irregular narrow carinæ, the apical portion with well-marked separated punctures, and the basal dorsal elevation much less marked. *Antennæ* with the scape only as long as the first 6 joints of the funicle; joint 1 of the funicle as long as the next 2½ joints, joints 2-6 all transverse, 7 as long as the club and longer than the three preceding joints. *Prothorax*

transverse, broadest at the base, rapidly narrowing in front, the sides strongly rounded and deeply constricted before the apex; the apical margin slightly produced dorsally, the postocular lobes small and fringed with long vibrissæ; the dorsal outline flat from the base to the constriction, then sloping slightly; the dorsum closely set throughout with low rounded tubercles. *Scutellum* entirely enclosed in front, small, elongate, bare. *Elytra* broad, suboblong, much broader than the prothorax, widest at the shoulders, which are acutely prominent, broadly rounded behind, the extreme apices dehiscent, the basal lobes strongly produced, and a shallow semicircular depression round the scutellum; the punctures very coarse and deep, especially in the area between the shoulders and the transverse band; the intervals narrower than the punctures, rugulose, shiny, and with sparse, small, plumose scales and minute recumbent setæ; the epipleural carina running from the middle of the metasternum to the apex of the third apparent ventrite. *Legs* (fig. 1, k) piceous, with numerous oblong fringed scales; the femora with very coarse confluent punctures and with a stout blunt tooth, which is largely hidden by long curved scales; the tibiæ more shallowly punctate, the front pair with a sharp tooth on the inner edge about the middle and another at the apex, the other pairs with only the apical tooth; joint 2 of the front tarsi twice as long as broad, with the inner (or anterior) lobe longer and narrower than the other. *Sternum* with all the coxæ more widely separated than usual; the metasternum rugose and depressed in the middle in both sexes, and coarsely granulate at the sides.

*Length* 8.5–9.5 mm., *breadth* 4.25–5.5 mm.

INDO-CHINA: Hoabinh, Tongking, viii. 1918 (*R. Vitalis de Salvaza*, type). ASSAM.

Described from twenty-four specimens.

This striking species may be readily recognised by its unusually flattened form, pointed shoulders, and very narrow straight rostrum. The specimens from Assam constitute a rather smaller local race, characterised by its much less prominent shoulders, and may be designated *Alcides vitalisi subhumerosus*, subsp. n.

When dealing a few years ago with the species of *Alcides* allied to *A. delta*, Pasc. (Ann. & Mag. Nat. Hist. (9) ii. 1918, pp. 152–157), I unfortunately overlooked a paper by Faust in which two species of this group were described (Stettin. ent. Zeit. 1896, pp. 149, 150). Of these *A. perturbatus*, Fst., is obviously the same as *A. javanodelta*, Mshl., and the latter

name therefore falls as a synonym; the second species, *A. dejeani*, Fst., does not appear to agree with any of the species dealt with in my paper.

## EXPLANATION OF PLATE VII.

- Fig. 1. *Alcides crinalifer*, sp. n.  
 Fig. 2. — *habenatus*, sp. n.  
 Fig. 3. — *loratus*, sp. n.  
 Fig. 4. — *pyrifer*, sp. n.  
 Fig. 5. — *jugalus*, sp. n.  
 Fig. 6. — *sterensi*, sp. n.  
 Fig. 7. — *subsc'latus*, sp. n.  
 Fig. 8. — *arcicollis*, sp. n.  
 Fig. 9. — *byanti*, sp. n.  
 Fig. 10. — *trigonophorus*, sp. n.  
 Fig. 11. — *vitalisi*, sp. n.

L.—On the Names of certain Parrots of the Genus *Lanius*,  
*Bodd.* = *Eclectus*, Wagl. By Lord ROTHSCHILD, F.R.S.

THE genus *Eclectus* has always excited much discussion, chiefly due to the extraordinary sexual dimorphism. Mr. Gregory M. Mathews has proved that the name *Lanius*, Bodd., has priority over Wagler's *Eclectus*, but ignores the "International Rule" which only allows names to be corrected by the author himself, and then ONLY in the same work in which he gave the name, and alters it to *Lorius*.

Count Salvadori, in the 'Catalogue of Birds,' enumerates six "species," as follows:—*pectoralis*, P. L. S. Müller; *roratus*, P. L. S. Müller; *cardinalis*, Bodd.; *riedeli*, Meyer; *cornelia*, Bp.; and *westermanni*, Bp.

Of these, *riedeli* and *cornelia* do not concern the present question at all, as the ♀ ♀ are entirely crimson-scarlet on upper and under side, and, although the ♀ of *westermanni* is very close to the two Moluccan forms, the ♂ has green flanks, and therefore this form also is outside our present problem.

Count Salvadori has used Philip Statius Müller's names for the New Guinea and North Moluccan forms, and it is a great pity that his names have been adopted by ornithologists, as the whole work is a compilation, and in many cases the descriptions are extremely doubtful and in others (as in the present instance) the names are founded on figures of older authors who give impossible or extremely doubtful localities. As, however, P. L. S. Müller's names are accepted by the larger number of ornithologists, I do not feel justified in over-throwing the name *roratus*, which is the chief crux in this

question. Having said this, however, I must point out that it has been applied to the wrong bird. P. L. S. Müller gave the name to the "Purpur-roode Lori" of Vosmaer (Mon. p. 10, t. vii., 1769), and Vosmaer states that his bird came from Ceylon! P. L. S. Müller, however, says "Amboina. Vosmaer." Now Count Salvadori applies the name *roratus* to the North Moluccan form, which comes from Batchian, Ternate, and Halmaheira, and adopts *cardinalis*, Bodd., for the South Moluccan bird, from Amboina, Ceram, and Bouiu. Although P. L. S. Müller's description of *roratus* fits both Moluccan forms, it is clear that it cannot by any possible means be made to fit the New Guinea form. Therefore, the question before us is to which of the two Moluccan forms must the name be applied; it is quite clear that P. L. S. Müller has applied the name *roratus* to Vosmaer's bird, which was stated to have come from Ceylon, and arbitrarily or from private conviction assigned the locality Amboina to it. As, however, all the older authors have assigned fantastic localities (Ceylon, China, Amazon River, &c.) to the birds of this genus, if we use the name *roratus* at all it must be applied to the bird from the locality stated by its author. Count Salvadori, therefore, could under no circumstances apply it to the North Moluccan bird; the only two courses open to him were either to reject the name altogether or to apply it to the bird from Amboina as done by its author. Now, the result of this is that the North Moluccan bird is without a name, and I propose for it the name of *vosmaeri*, nom. nov. As the whole of the forms of this genus replace one another in their respective localities, I look upon the genus *Larius* as consisting of one species, with nine subspecies, as follows:—

- Larius roratus roratus*, P. L. S. Müll. South Moluccas.
- *vosmaeri*, Rothsch. North Moluccas.
- *westermanni*, Bp. ?.
- *pectoralis*, P. L. S. Müll. New Guinea and adjoining islands.
- *aruensis*, G. R. Gray. Aru Islands.
- *solomonensis*, Rothsch. & Hart. Solomons and New Britain Archipelago.
- *macgillivrayi*, Math. N. Queensland.
- *riedeli*, Mey. Timor Laut Islands.
- *cornelia*, Bp. Sumba.

If it is considered that P. L. S. Müller's name of *pectoralis* is inadmissible, as applying to Moluccan rather than Papuan birds, the name of *roratus polychloros*, Scop., must be used for the Papuan subspecies.



LI.—*Note on a new Snow-Vole from Montenegro* [*Microtus* (*Chionomys*) *bogdanovi*, *sp. n.*]. By V. and E. MARTINO.

*Type-locality*.—Cetinje, Montenegro. Alt. 680 m.

*Geographical distribution*.—At present known only from type-locality.

*Diagnosis*.—Upper parts smoke-grey without brownish tinge. Underparts whitish grey. Hind foot more than 23 mm. Tail nearly as long as  $\frac{3}{4}$  head and body, bicolor except the terminal part. Outer side of first loop of the anterior lower molar irregular (with one or two small concavities).

*Measurements*.—No. 279 (type of species), ♂: head and body 99.0 mm.; tail 74.0; hind foot 25.0; ear 15.0. No. 281, ♀: head and body 100.0; tail 77.0; hind foot 25.0; ear 15.5.

Cranial measurements of two specimens (male and female, the first the type) :—

	♂ (type of spec.). Cetinje. No. 279. 1. xii. 21.	♂. Cetinje. No. 281. 2. xii. 21.
	mm.	mm.
Greatest length .....	28.6	28.8
Zygomatic breadth .....	16.1	16.0
Interorbital constriction ....	4.8	4.7
Nasals .....	8.3	8.3
Diastema .....	7.8	7.8
Maxillary tooth-row .....	7.0	7.2
Mandibular tooth-row .....	7.1	7.1

Type in the British Museum.

*Field Notes*.—On the stony sides of mountains, covered here and there with brushwood of *Caprinus*, at the same places as the *Apodemus epimelas*, Nhr.

Comparatively rare.

LII.—*A new Trichostrongyle Genus from an Armadillo*,  
*Euphrectus villosus*. By R. J. ORTLEPP, M.A.\*.

IN December 1921 an Edentate—*Euphrectus* (*Dasypus*) *villosus*, Argentine—died in the Gardens of the Zoological Society, Regent's Park, London. From the intestine of this animal I collected a number of nematode parasites, which,

\* From the Helminthological Department, London School of Tropical Medicine.

from their size, colour, and general contour of the body, I take to be the same as that described by Parona and Stossich in 1901 as *Æsophagostomum tuberculatum*, sp. n., from *Dasypus villosus*, S. America. The description and figures of these workers are, however, very incomplete, and it seems desirable to attempt a redescription. This is all the more necessary, because Parona and Stossich unfortunately referred this parasite to a wrong genus.

The parasites were found irregularly distributed throughout the small intestine, and were easily seen because of their brilliant red colour. They were collected into normal saline, examined alive, and then killed by the hot 70% alcohol method. Afterwards they were transferred to glycerinated 70% alcohol. By allowing the alcohol to evaporate, the parasite eventually came to lie in pure glycerine. This procedure rendered the specimens sufficiently transparent for examination; but, in order to make out the details of the spicules, the males were cleared in Langeron's lacto-phenol.

### *Description.*

*Male.*—The males have an average length of about 6.5 mm. and breadth .33 mm. The body is red and forms a spiral of three or four turns, of which only the last one or two coils straighten out when the animals are killed in hot alcohol.

The transverse cuticular striations (fig. 1, *a*) are well marked on the ventral surface, where they form a broad and conspicuous band commencing about 100  $\mu$  from the anterior end and extending almost halfway down the length of the worm; on the rest of the cuticle these striations are only faintly indicated, and in some places are difficult to see. Longitudinal striations are present, but are very faint.

The cuticle around the anterior end forms a vesicular swelling (fig. 1, *a* and *b*). This surrounds the head and is about 75  $\mu$  long by 55  $\mu$  broad. It is terminated behind by a deep constriction which completely encircles the body. Externally it shows about twenty very faint transverse striations. The rest of the cuticle is remarkable in that it is enormously inflated, this inflation being more pronounced on the dorsal surface, where it may reach a thickness of over 100  $\mu$  at about the middle of the body.

Lateral alæ are absent.

Cervical papillæ were not observed, although carefully looked for.

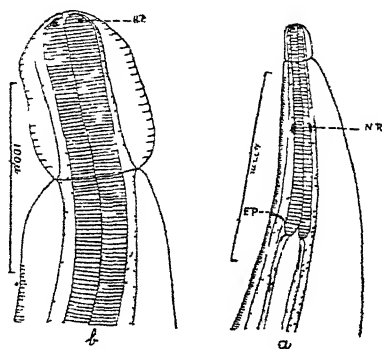
The anterior end of the worm bears four minute papillæ—two subdorsal and two subventral. These in cleared specimens stand out as clear and refringent dots.

The small oral aperture leads direct into the œsophagus, there being no indication of a mouth-capsule. The œsophagus (fig. 1 *a*) is straight, elongate, and slightly thickened posteriorly, measuring on an average about 450  $\mu$  long and 50  $\mu$  at its broadest part.

The nerve-ring is situated slightly in front of the middle of the œsophagus.

The position of the excretory pore does not appear to be constant, in that in some specimens it was situated at the level of the hind end of the œsophagus, whereas in others it

Fig. 1.



*a.* Anterior portion of *Trichoelix tuberculatum* (Parona and Stossich, 1901). *b.* Head, much enlarged.

*E.P.* = excretory pore; *N.R.* = nerve-ring; *H.P.* = head-papilla.

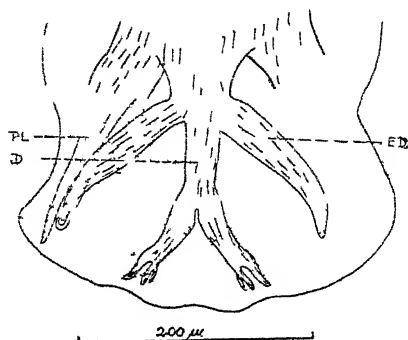
was pushed slightly forwards; the latter position, however, is the more common (fig. 1, *a*). From the pore the excretory duct passes almost vertically inwards, and on reaching the œsophagus bends abruptly backwards.

The bursa (figs. 2 and 3) is short and broad, and is about three times as broad as it is deep; posteriorly it is slightly notched in the mid-line, and a shallow depression on each side gives it a slight trilobed shape.

Of all the bursal rays the dorsal is the stoutest. This ray measures about 50  $\mu$  broad at its base and is about 200  $\mu$  long. After the origin from it of the externo-dorsal rays it is only about half this thickness. About midway between the origin of the externo-dorsal rays and its tips it divides into two branches, and each of these latter is again split at its tip. Each inner terminal branchlet bears on its inner side a much thinner and parallel twig.

The externo-dorsal ray is stout and slightly arched. Its maximum thickness ( $28\ \mu$ ) is near its origin, after which it gradually tapers to an obtuse point. It terminates some

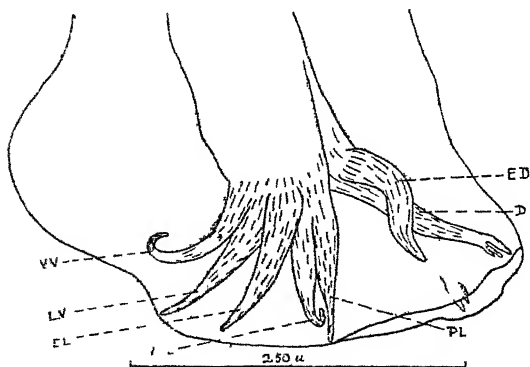
Fig 2



Dorsal view of bursa (lateral rays of right side not indicated).

*D.*=dorsal ray; *ED.*=externo-dorsal ray; *PL* = postero-lateral ray

Fig. 3.



Left lateral view of bursa

*D* = dorsal ray, *ED* = externo-dorsal ray; *EL* = externo-lateral ray, *LV* = latero-ventral ray; *ML* = medio-lateral ray, *PL* = postero-lateral ray, *VV* = ventio-ventral ray

distance from the edge of the bursa. The postero-lateral and medio-lateral rays are almost parallel and of the same length and thickness; the former, however, is straight and passes to

the edge of the bursa, whereas the tip of the latter is sharply recurved dorsalwards. The externo-lateral ray is the thickest of the lateral rays, and is inclined slightly forwards and ventralwards, as also does the latero-ventral ray. The ventro-ventral ray is bent wholly in an arch directed forwards and inwards.

There are no prebursal papillæ.

The spicules (fig. 4) are of a brown colour; they are large, tubular, and equal in length. The base of each is bent outwards almost at right angles to the stem. They measure

Fig. 4.

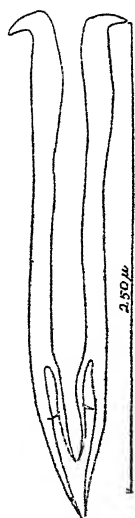


Fig. 5.

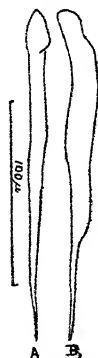


Fig. 4.—Spicules, dorsal view.

Fig. 5.—Gubernaculum. A=dorsal view; B=side view.

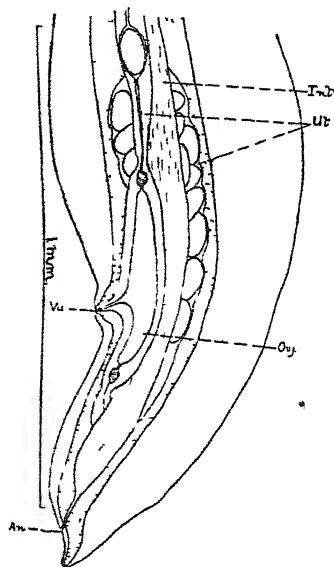
$270\ \mu$  in length by  $18\ \mu$  in maximum breadth; posteriorly each has a dorsal branch which is bent slightly ventralwards. Each branch bears on its inner surface, about in its middle, a ventrally projecting spike-like process.

The gubernaculum (fig. 5, A and B) is conspicuous, measuring about  $140\ \mu$  in length; posteriorly it is thickened into a knob  $20\ \mu$  long by  $10\ \mu$  broad; anteriorly it tapers to a rounded point. On its dorsal surface it bears a keel; this is about  $14\ \mu$  deep and extends for about half its length from the posterior end.

*Female*.—The average length of the female is about 8.75 mm., with a maximum breadth of about .5 mm. a little above the level of the vulva. It also possesses the general external characters of the male—i. e., it is spirally coiled, red in colour, and the cuticle is very much inflated, with the striations as in the male. The vesicular swelling is slightly longer than in the male, measuring on the average  $81\ \mu$  by  $69\ \mu$ ; it also shows fine transverse striations.

Lateral alæ and cervical papillæ are absent.

Fig. 6.



Posterior end of female, seen from the left side.

An.=anus; Int.=intestine; Ovj.=ovjector; Ut.=uteri; Vu.=vulva

The mouth, which is also surrounded by four very small papillæ, leads into the œsophagus; this organ is straight and cylindrical in shape, slightly thicker behind. It is longer than that of the male, being on an average .52 mm. long. The nerve-ring, which encircles it, is situated about  $220\ \mu$  from the anterior end.

The opening of the excretory pore is slightly in front of the junction of the œsophagus and intestine.

The vulva is situated towards the posterior end of the body (fig. 6); it is a slit-like aperture .45 mm. in front of the

anus. The vagina is short and straight, measuring only about  $45\ \mu$  in length. It leads direct into the well-developed ovijectors. The ovijectors are straight and divergent, and the combined length of their muscular portions, including the sphincters, is about  $45\ \text{mm}$ .

The left uterus joins the anterior ovijector; the right uterus passes down the body more or less parallel to that of the right side, and extends further backwards than the posterior ovijector; having reached its posterior limit, it recurves sharply forwards and joins the posterior ovijector.

The coils of the ovaries extend into the anterior part of the body, the termination of the right ovary being situated slightly more than  $1\ \text{mm}$ . from the anterior end.

The eggs are large, oval, and thin-shelled, measuring  $108\ \mu$  by  $54\ \mu$ ; prior to being laid they already are in the morula-stage, and in females which were kept in normal saline overnight the eggs were observed to have embryonated *in utero*.

From the anus the body tapers abruptly to form a short tail, about  $75\ \mu$  long.

Parona and Stossich, in their description of *Æsophagostomum tuberculatum*, write "Peculiari e curiosi sono i tubercoli della pelle, che le danno il carattere veramente specifico." In all the specimens from *Euphrectus (Dasypus) villosus* examined I was unable to find any indications of these tubercles either in living or preserved worms. I can thus only presume that the tubercles seen by them were artificial and due to poor fixation. Further, they state that the mouth is "circondata da un esilissimo cercine." This I was unable to see. The vesicular swelling of the head passes very slightly anterior to the mouth-aperture, and it would appear that the ring or cap surrounding the mouth observed by them must be this slight projecting portion of the vesicular swelling, which, at its junction with the mouth-aperture, may have the appearance of a chitinous ring.

They also mention the presence of three minute papillæ on the tip of the tail of the female, and, although I have repeatedly sought for these, I am unable to find any signs of them.

The entire absence of a mouth-capsule with its leaf-crown, and the nature of the spicules and bursa, are sufficient to show that this parasite does not belong to the genus *Æsophagostomum*, Molin, 1861. The mouth- and head-characters,

together with the presence of two ovaries &c. in the female, place it in the subfamily Trichostrongylinae, Leiper, 1908. This parasite differs widely from all known Trichostrongyle genera, its closest relation possibly being *Cooperia*, Ransom, 1907. It, however, differs from *Cooperia* in several respects, more especially in the shape of the dorsal ray and the relative thicknesses of the lateral rays of the bursa. The position of the vulva in this parasite is also quite different, in being placed much further back than in *Cooperia*.

I propose to designate this parasite as type-species of a new genus

TRICHOHELIX, gen. nov.,

of which the following may be taken as the chief characters:—

Trichostrongylinae. Body red and spirally coiled. Head round and thick, about  $35\ \mu$  in diameter. Cuticle round head inflated to form a vesicular swelling, limited behind by a deep constriction encircling the neck. Rest of the cuticle strikingly inflated and showing marked transverse striations only on the anterior half of the ventral surface. Longitudinal striations faint. Lateral alae absent. Cervical papillae absent. Male bursa indistinctly trilobate. Dorsal ray stout, bifurcate, and its tips are tripartite. Tip of medio-lateral ray sharply recurved. Ventro-ventral ray strongly arched forwards and inwards. Spicules straight, tubular, equal, and of medium size; they are branched posteriorly. Gubernaculum present. Prebursal papillae absent. Vulva situated slightly in front of the anus. Ovijectors well developed and divergent. Uteri parallel. Eggs large, oval, and thin-shelled, measuring over  $100\ \mu$  in length.

Type-species, *Trichohelix tuberculata*, Par. & Stoss., 1901.

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LIII.—*A new Cestode and other Parasitic Worms from Spitsbergen, with a Note on Two Leeches. Results of the Oxford University Expedition to Spitsbergen.*—No. 6. By H. A. BAYLIS, M.A., D.Sc.

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THE parasitic worms collected by members of the Oxford University Expedition to Spitsbergen include a new and interesting Cestode from a seal, two species of Acanthocephala, and one of Nematoda. The writer is indebted to Mr. C. S. Elton for kindly handing this material to him for determination.

The following are the species contained in the collection:—

## CESTODA.

### CYCLOPHYLLIDÆ.

#### Fam. Tetrabothriidæ.

*Anophryocephalus anophrys*, gen. et sp. n.

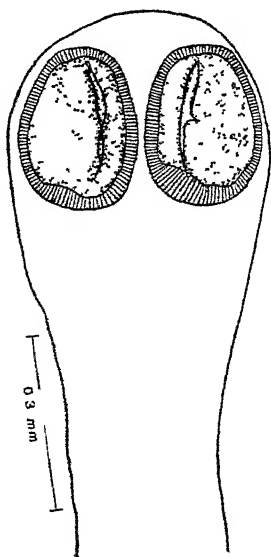
Host: a young female seal (*Phoca hispida*?). Locality: Klaas Billen Bay.

This interesting form agrees closely with typical species of the genus *Tetrabothrius* in its general anatomy, but differs strikingly from that genus in the structure of its scolex. In *Tetrabothrius* the scolex is always provided with "auricular appendages," more or less highly-developed, but in the present species such structures are entirely absent, the scolex having the general appearance of that of the Anoplocephalidæ or of certain unarmed genera of other families.

The material consists largely of fragments, but the length of a complete specimen appears to be about 65 mm. The maximum width of the strobila is about 0.85 mm. The dorso-ventral thickness is relatively great, so that some specimens are almost cylindrical in shape. The scolex (fig. 1) is somewhat compressed dorso-ventrally, and has a

transverse diameter of 0.46–0.55 mm. Two of the suckers are situated on the dorsal and two on the ventral surface. They are of an oval shape, having a diameter of about 0.3 mm. antero-posteriorly and of 0.2 mm. transversely. The apertures of the suckers are in the form of longitudinal slits. The scolex is followed by a narrower unsegmented "neck," which may attain a length of 6 or 7 mm. There may or may not be a constriction immediately behind the scolex. In a complete strobila some 490 segments can be counted. All the segments are broader than long. The

Fig. 1.



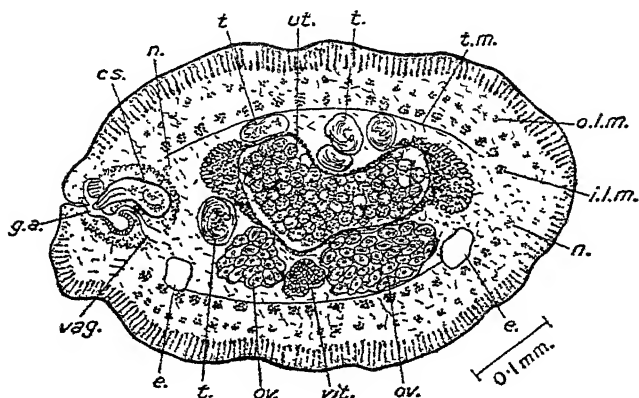
*Anophryocephalus anophrys*. The scolex  
(from a stained specimen in balsam).

genital organs appear early, and the number of sexually mature segments is relatively large. The uterus does not become a conspicuous organ until about the 350th segment is reached. The disappearance of the male and female glands, after the appearance of the uterus, is very gradual, and some traces of them remain even in the oldest gravid segments observed.

The subcuticular layer of the body-wall contains large numbers of elongated gland-cells, staining deeply with hæmatoxylin. The cortical parenchyme is thick, measuring

in depth nearly a quarter of the total dorso-ventral diameter of the worm. The longitudinal musculature is well-developed, consisting of an inner layer (fig. 2, *i.l.m.*) of larger, and an outer layer (fig. 2, *o.l.m.*) of smaller, bundles of fibres. Of the former there are about twenty bundles dorsally and a similar number ventrally. They lie immediately outside the very scanty layer of transverse fibres (fig. 2, *t.m.*), which forms the boundary between the cortical and medullary parenchyme. At the level of this transverse layer, on the ventral side, lie the two large ventral longitudinal excretory canals (figs. 2, 3, *e.*). Dorsal

Fig. 2.



*Anophryocephalus anophrys*. Transverse section through a mature segment.

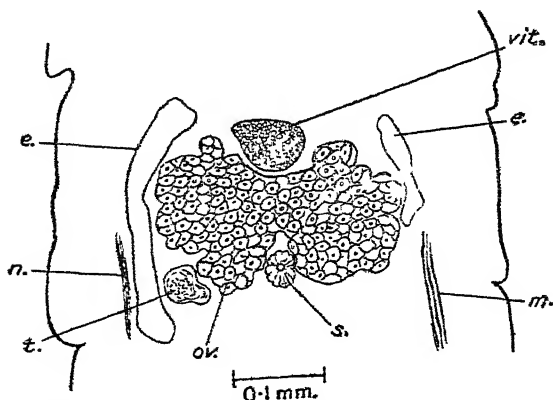
*c.s.*, cirrus-sac; *e.*, excretory vessels; *g.a.*, genital atrium; *i.l.m.*, inner layer of longitudinal muscles; *n.*, longitudinal nerves; *o.l.m.*, outer layer of longitudinal muscles; *ov.*, ovary; *t.*, testes; *t.m.*, transverse muscles; *ut.*, uterus; *vag.*, vagina; *vit.*, yolk-gland.

longitudinal canals and transverse connecting vessels between the ventral canals appear to be entirely absent.

The genital pores are all on the right side. The genital ducts pass dorsally to the excretory canal and ventrally to the longitudinal nerve of that side. The external pore leads by a narrow canal into a rather small genital atrium (fig. 2, *g.a.*), corresponding to that of *Tetrabothrius*, into which the cirrus-sac and vagina open separately, the latter ventrally to the former. Immediately below the opening of the vagina the wall of the atrium forms a small, rounded,

muscular chamber. The cirrus-sac (fig. 2, *c.s.*) is more elongate than in *Tetrabothrius*, and measures about 0.125 mm. in length and 0.05 mm. in thickness. There is a much-coiled vas deferens. The vagina, near its opening into the genital atrium, is very narrow, but after a short distance widens suddenly into a large thin-walled tube. This runs towards the middle line of the segment, and then curves dorsally, narrowing again here and becoming invested with a conspicuous outer coat of glandular cells. The large testes (figs. 2, 3, *t.*) are about thirty in number, and are mostly situated on the dorsal side of the segment. Some, however, lie at the level of the uterus, especially

Fig. 3.



*Anophryocephalus anophrys*. Horizontal section through a mature segment, towards the ventral side.

*e.*, *e.*, excretory vessels; *m.*, one of the longitudinal muscle-bundles; *n.*, nerve; *ov.*, ovary; *s.*, shell-gland; *t.*, testis; *vit.*, yolk-gland.

anteriorly and posteriorly to it, and a few are even found still more ventrally. The ovary (figs. 2, 3, *ov.*) is a large bilobed organ, occupying the whole width of the medullary parenchyme when fully-developed. It has a narrow "waist" in the middle region, and two large, backwardly-directed, lateral lobes. In the space between these lobes is situated the shell-gland (fig. 3, *s.*). In front of the middle portion of the ovary is the compact yolk-gland (figs. 2, 3, *vit.*), its duct passing ventrally to the "waist" of the ovary straight back towards the shell-gland. The uterus (fig. 2, *ut.*) appears as a crescentic transverse tube, as in

*Tetrabothrius*, lying dorsally to the ovary and with the horns of the crescent directed posteriorly. Its wall is composed of cells which stain very deeply with hæmatoxylin. It gradually expands in the older segments, but never entirely loses its original crescentic shape.

Onchospheres have not been observed. It may be that the gravid segments are lost before the full development of the ova in the uterus has taken place.

In view of the arrangement of the genital organs, it seems necessary to regard this form as very closely related to *Tetrabothrius*. In addition to the difference in the structure of the scolex, the condition of the excretory system (absence of dorsal vessels and transverse ventral vessels) and the shape of the cirrus-sac (as distinct from the squat, spherical or triangular shape usual in *Tetrabothrius*, are possibly characters of generic importance.

The family Tetrabothriidæ is at present usually restricted to the genus *Tetrabothrius*. (The form described by the writer (1914) under the name of *Octopetalum* probably does not belong to this family.) The presence of auricular appendages, therefore, has hitherto been regarded as a family character, and the inclusion of *Anophryocephalus* in the family necessitates alteration of the family diagnosis in this particular. The family diagnosis given by Lühe (1910) also includes the condition of the excretory canals usual in *Tetrabothrius*, but this is omitted by other authors (Fuhrmann (1908), Ransom (1909)).

It is interesting to observe that some species attributed to *Tetrabothrius* are recorded in Cetacea, although the majority of the species are found in birds. In seals, up to the present, all the cestodes recorded appear to belong to the Pseudophyllidea (genera *Diphyllobothrium*, *Pyramicocephalus*, *Diplogonoporus*, &c.).

#### NEMATODA.

##### Fam. Ascaridæ.

##### *Contracæcum osculatum* (Rud., 1802).

A small immature individual, probably belonging to this species, was taken from the stomach of the same seal.

#### ACANTHOCEPHALA.

##### *Corynosoma strumosum* (Rud., 1802).

Several specimens were found attached to the wall of the large intestine of the seal already mentioned.

*Echinorhynchus longicollis*, Villot, 1875.

The body of a turnstone (*Arenaria interpres*), preserved in spirit, was submitted to the writer to be examined for internal parasites. In the upper part of the intestine there were a number of cestodes of one or two species, too poorly preserved to be identified. In the lower portion, for some three inches above the origin of the cæca, were found several specimens of the above-mentioned *Echinorhynchus*. At the point of attachment of each worm there was a conspicuous nodular swelling on the external surface of the wall of the intestine. Two of the worms were attached at the same level, so that the two nodules, viewed from the exterior, at first looked like a paired structure proper to the bird's intestine. Each nodule was filled with dense material, in which the proboscis of the worm was firmly embedded.

*Echinorhynchus longicollis* does not seem to have been fully described, and its proper systematic position remains uncertain. Lühe (1911) suggests that it perhaps belongs to the genus *Arhythmorhynchus* or to some closely-related genus. In *Arhythmorhynchus* the proboscis is highly characteristic, having a swelling in the middle of its length and remarkable local variations in the form and size of the hooks. There is also a characteristic swelling of the anterior portion of the body. These peculiarities are absent in the present material. The proboscis appears to be nearly cylindrical and the hooks of almost uniform size, so that it appears impossible to assign the species to *Arhythmorhynchus*. The condition of the material, however, scarcely warrants an attempt to give a new description.

## HIRUDINEA.

Two leeches were obtained by dredging in Klaas Billen Bay, and these appear to belong to the following species:— (1) *Abranchus scorpii* (Malm), taken at about 15 fathoms; (2) probably *Pontobdella muricata* (L.). The latter is a very small individual, and does not show the characteristic warty papillæ of the skin. These, however, are not always visible in *P. muricata* \*. The specimen had stained the spirit in which it was received a bright green, and the presence of a green pigment soluble in alcohol is highly suggestive of *P. muricata*.

\* See Harding, 'Parasitology,' iii. (1910), p. 144.

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## LIV—New Art + old Art + old

By W C CRAWLEY, B A, F L S F R M S

This paper deals with one or two exceptions, with its collected by Mr J Clark in Western Australia principally in the Perth district. In addition to new species, races, and varieties, we have been able, thanks to Mr Clark's very thorough collecting, to add descriptions of many males and females of species the workers of which were hitherto only known.

Opportunity has been taken to re-describe some of F. Smith's much discussed types, as a good deal of misapprehension has existed among foreign myrmecologists who have been unable to see the types themselves.

I am indebted to my friend, Professor Carlo Emery, for his unfailing kindness in giving me the benefit of his knowledge in doubtful cases.

### List of species

## Subsum POWERIN L

*M. necia* index, Sm

— LUTRA, sp. n.

— *handen*, *Ec*, race SWALEH st n

— *nigriscapa*, Reu

— *chu ei*, For, var LUDLOWI, nov

— CLARKI, sp. n.

— (*Pristomyr miera*) *mandibularis*, Sm

— (—) *michaelseni*, 101 v u PERTHENSIS, nov

*Amblyopone michaelsoni*, For

— *austriale*, Enchs

*Phryacates* CLARKI, sp. n.

— *conversa*, MAVI, lace violacea FOI, var SUBUMBRA, n v

— (*Chalcoponea*) *metallica*, Sm

— (—) —, var INORNATA, NOV

— (—) —, var VARIANS n v

— (—) *α ποια*, Roger ♂ ♀ hithert undescribed

- Euponera* (*Brachyponera*) *lutea*, Mayr. ♂ ♀ ♂.  
*Leptogenys* (*Lobopelta*) *neutralis*, For. ♀ hitherto undescribed.  
*Diacamma austriale*, F.  
*Odontomachus coriarius*, Mayr, var. *OBSCURA*, nov.

## Subfam. MYRMICINÆ.

- Podomyrma* *nuda*, sp. n.  
*Meranoplus hirsutus*, Mayr, race *RUGOSA*, st. n.  
 — *FERRUGINEUS*, sp. n.  
 — *HILLI*, sp. n.  
*Monomorium OCCIDANEUS*, sp. n.  
*Cardiocondyla nuda*, Mayr. ♂ ♀.  
*Solenopsis CLARKI*, sp. n.  
*Aphænogaster POULTONI*, sp. n.  
*Crematogaster PERTHENSIS*, sp. n.  
 — *rufotestacea*, Mayr. ♂ ♀ hitherto undescribed.  
 — *leviceps*, Mayr, var. *chusei*, For.  
*Pheidole megacephala*, F.  
 — *dolichocephala*, And.  
 — *ampla*, For, race *PERTHENSIS*, st. n.  
 — *impressiceps*, Mayr.  
 — (*Anisopheidole*) *froggatti*, For.

## Subfam. DOLICHODERINÆ.

- Dolichoderus* (*Hypoclinea*) *ypsilon*, For.  
 — (—) —, var. *NIGRA*, nov.  
*Iridomyrmex conifer*, For. ♂ hitherto undescribed.  
 — *detectus*, Sm.  
 — *discors*, For.  
 — *rufoniger*, Lowne.  
 — —, race *suchieri*, For.  
 — *itinerans*, Lowne, race *nitidiceps*, And.  
 — *gracilis*, Lowne.  
 — *innocens*, For.  
 — *glaber*, Mayr.  
 — *ersanguis*, For. ♂ hitherto undescribed.  
*Bothriomyrmex FLAVUS*, sp. n. ♂ ♀ ♂.  
 — *SCISSOR*, sp. n. ♀.

## Subfam. CAMPONOTINÆ.

- Melophorus fieldi*, For.  
*Prenolepis obscura*, Mayr. Typical form.  
*Acantholepis* (*Stigmacros*) *OCCIDENTALIS*, sp. n.  
*Camponotus* (*Myrmocamelus*) *ephippium*, Sm., race *narses*, For.  
 — (—) *cinereus*, Mayr, race *notteræ*, For.  
 — (*Myrmosaga*) *chalceus*, Crawley. ♂ ♀ ♂.  
 — (*Dinomyrmex*) *doryceus*, Sm., race *coxalis*, Sm.  
 — (*Myrmophyma*) *testaceipes*, Sm.  
 — (—) *claripes*, Mayr, race *elegans*, For.  
 — (—) —, race *MINIMA*, st. n.  
 — (—) *lounet*, For. ♂ ♀ hitherto undescribed.  
 — (*Myrmogonia*) *TUMIDUS*, sp. n.  
 — (*Myrmosphincta*) *molossus*, For.  
 — (*Myrmoturba*) *nigriceps*, Sm., race *obniger*, For., var. *prostans*, For.  
 — (—) —, race *dimidiata*, Roger, var. *perthiana*, For. ♂ ♀ hitherto undescribed.  
*Polyrhachis* (*Hagiomyrma*) *ammonœides*, For.  
 — (—) *ammon*, F.  
 — (*Camponomyrma*) *sidnica*. MAYR. var. *PERTHENSIS* nov.



*Myrmecia* LUTEA, sp. n.

♂. Length 15–20 mm. (without mandibles); length of mandibles in largest specimens 3.9 mm.

Antennæ, thorax, legs, and petiole obscure yellow-ochre in colour; mandibles, except teeth which are tipped with black, a brighter yellow. Head dark chocolate-brown, sometimes nearly black; gaster black or, at least, very dark brown.

Very slender, similar in form to *gracilis*, Em. Head small, narrowing considerably behind eyes, smaller and with more rounded angles than in *nigriceps*, Mayr (which it resembles somewhat in colour). The head is narrower behind than in either *vindex* or *nigriceps*, even in the largest ♂ ♀, where in all three forms the head is more massive proportionately.

The first node in largest ♂ ♀ is longer than the stalk, in the smaller about equal. Underneath in front is a small tooth\*.

Head longitudinally rugose, but beyond the level of eyes the rugæ have numerous cross-lines, and the sculpture becomes almost reticulate-punctate. The sculpture of the head is much more superficial than in *nigriceps*. Sculpture of pronotum also much more superficial than in *nigriceps*; that of the mesonotum variable, in most specimens it is transversely striated, but in one or two from the same colony the striation is longitudinal, and in others the segment is almost smooth.

Ludlow, W. Australia (Clark, nos. 2 and 5).

Type W. C. C. coll.

Intermediate between *gracilis* and *nigriceps*.

The ants of the genus *Myrmecia*, sometimes called "Bulldog" ants, are also known as "Jumpers." Mr. Clark has found that some species can leap a distance of three or four inches.

*Myrmecia harderi*, For., race SWALEI, st. n.

♂. Length (without mandibles) 9.0 mm.; length of mandibles 1.3 mm.

Deep black; mandibles yellow, tinged with brown along their apical half. Thorax and petiole light red, legs dark brown, tarsi lighter. Antennæ missing, except the nine terminal joints of the left funiculus, which are dark brown. Postpetiole and gaster with a faint blue metallic sheen. Body and legs with a fine pale pilosity, most abundant on

\* In *vindex* and *nigriceps* the first node is conspicuously longer than the stalk in all sizes of the ♂. In *lutea* this node in profile arises rather more abruptly, and is less evenly rounded above than in *vindex*.

petiole and gaster, postpetiole and gaster in addition have a moderately close grey pubescence.

Mandibles slender, their outer border barely concave, inner border with two large teeth besides the apical tooth; between the latter and the first large tooth are two small ones; between first and second large teeth are three small ones, and behind the second large tooth are 4-5 irregular teeth. Head broader than long, broadest in front, occipital border nearly straight. Clypeus widely excavated. Funicular joints, as far as can be ascertained, diminish in length up to the 9th joint, then increase in length slightly. Eyes large, almost touching base of mandibles. Ocelli distinct, flat. Thorax short and broad, hardly narrowing at all behind the pronotum; in profile regularly curved, highest at commencement of epinotum; pronotum somewhat depressed; a slight incision between meso- and epinotum. The latter forms a wide rounded angle between its two faces, the base being longer than the declivity. Legs short. Petiole from above as broad as long, wider behind, where the angles are more rounded than in front; in profile cubic, with parallel sides, the stalk very short and thick. Postpetiole about twice as wide as the petiole, campaniform, wider than long, widest just beyond the middle; a projection extends on its under surface beneath the petiole.

Mandibles smooth and shining, with 4-5 punctures along the line of teeth. Head longitudinally coarsely rugose, the rugæ becoming broken as they approach the occiput. Thorax more coarsely rugose; on the pronotum the rugæ are deep, regular, and longitudinal, spreading slightly from the front outwards; on the mesonotum they are longitudinal, but not quite so regular; on the first half of base of epinotum they are longitudinal, and on the remainder and on the declivity they are transverse. The petiole is longitudinally rugose above and transversely behind. Postpetiole and gaster have a fine reticulate ground-sculpture; between the rugæ on the head there is also a ground-sculpture.

A single ♂ from Albany, received from the late Dr. H. Swale.

Type W. C. C. coll.

Slightly smaller than *harderi*, For., and considerably smaller than *pilosuta*, Sm., and its race *mediorubra*, For. From the two latter it differs by the much coarser sculpture and the narrower and straighter mandibles. It differs from *harderi* in having the postpetiole (or second node) only finely reticulate instead of coarsely rugose. The thorax is also stouter, and the head, postpetiole, and gaster of a deeper

black colour. The terminal joints of the funiculus are distinctly shorter than in *pilosula*.

*Myrmecia chasei*, For., var. *LUDLOWI*, nov.

♀. Agrees with Forel's description of *chasei* with the following differences:—Some specimens slightly smaller. Mandibles 3.5 mm. long, somewhat longer than the head (as long as head in type). Shoulders of pronotum apparently not so pronounced. Clypeus widely but not deeply emarginate. First node once and a half as broad as long (almost twice as broad as long in type), second node twice as broad as long (two and a half times as broad as long in type). Head densely reticulate between the rugæ, but on the thorax and first node the space between the rugæ is more or less smooth and shining. The neck of the pronotum is transversely striate, the rest longitudinally, the striæ slightly diverging in the direction of the base of the segment; the second node is irregularly longitudinally rugose. There is a prominent central ridge on the first node.

Colour similar, but there is a black patch on the lower half of the mesosternum, and a small one on the metasternum.

The mandibles in their complete form have the typical long curved apical tooth of *Myrmecia*, sensu stricto, but in all the series, except two specimens, this tooth is completely worn away, leaving the mandibles with an oblique point.

Ludlow, W.A. (*Clark*, no. 12).

Type W. C. C. coll.

This ant builds a cone-shaped earth-mound about one foot in height, with an entrance on the top about two inches in diameter, but there are also other entrances in the ground beyond the mound. It is an active and fierce insect.

*Myrmecia michaelsoni*, For., var. *PERTHENSIS*, nov.

♀. Length 10 mm. (without mandibles); mandibles 2.5 mm. Differs from the type as below:—

*michaelsoni*.

Black; point of mandibles and funiculus, and tarsi brown.

Scape does not reach occiput. First joint of funiculus equals second.

Second node almost twice and a half as broad as the first.

var. *perthensis*.

Dark brown; mandibles, antennæ and legs red-brown; thorax and first node sometimes red-brown; second node red-brown.

Scape exactly reaches the occipital border at its centre. First joint slightly shorter than the second.

Second node not quite twice as broad as first.

Sculpture similar to that of the type; the rugæ on the head are fairly rugular and coarse, on the pro- and mesonotum they are regular but finer; the epinotum is exactly as in *michaelseni*; the first node is more coarsely rugose than the head. The rest as in *michaelseni*, including the deep golden pelisse on gaster.

Perth (Clark, no. 65).

Type W. C. C. coll.

I have not seen a specimen of *michaelseni*, but have made the comparison with Forel's very complete description.

*Myrmecia* CLARKI, sp. n.

♂. Length (without mandibles) 9·8–10 mm.; length of mandible 2·4 mm.

Black; mandibles and tarsi dark yellow, antennæ nearly black.

A few hairs on mandibles, clypeus, and apex of gaster, the latter with a very thin grey pubescence.

Mandibles considerably longer than head, narrow, the outer edge feebly concave, the point long and curved, followed by three large teeth with two smaller between each pair, the remaining half of the mandible bears a ridge of 6–8 small teeth directed backwards. Eyes large, occupying more than half the sides, and almost touching the base of mandibles. Scape passes the occiput by about its width. Joint 2 of funiculus once and a half as long as first, the third as long as first, the remainder diminishing in length to the apical, which is slightly longer than the preceding. The whole antenna thinner than in *pilosula*. Head broader than long, slightly narrowed behind, the occipital border feebly concave. Clypeus incised in centre of anterior border, but not depressed up the centre as in *pilosula*.

Thorax similar to that of *pilosula*, but the mesonotum shorter and broader proportionately. Epinotum in profile rather more convex than in *pilosula*. First node from above as broad as long, broader than in *pilosula*; in profile it is higher behind. Second node once and a half as broad as the first.

Mandibles with scattered small punctures, and a few elongated ones near the apex. Whole of head regularly and finely striate longitudinally. Pronotum with coarser regular ridges, encircling the neck and sides, longitudinal on top. Mesonotum and base of epinotum similarly longitudinally striate, declivity transversely striate. First node coarsely longitudinally rugose; second and gaster microscopically reticulate. There is a similar reticulate ground-sculpture on the whole body.

Mundaring Weir, W.A. (Clark, no. 112).

Type W. C. C. coll.

*Pilosula* group, and differs from *pilosula* principally in colour of mandibles and antennæ, and thinner and longer mandibles, narrower occiput, and in the shape of the thorax and nodes. The ♀ pupa measures 11.0 mm.

*Phyracaces* CLARKI, sp. n.

Length 6.5 mm.

Uniform dark castaneous, with some indistinct dark smudges on second segment of gaster.

External border of mandibles concave. Head slightly broader than long, broadest at eyes, narrowest in front, occipital border concave with somewhat sharp lateral angles. Frontal carinæ similar to those of *singularis* as described by Forel, the narrow posterior prolongation reaching to beyond the middle of the eyes, which are prominent and situated slightly behind the middle of sides of head. Carinæ of cheeks prominent, the posterior portion concave, the anterior portion convex, terminating at the side in a tooth-like angle. The carina is bordered by a ridge which, seen from the side, forms a rectangular enclosure not quite touching the base of the mandibles and then almost completely encircling the eye. A ridge also commences below the base of the mandible, and forms the lateral and posterior border of the head. The scapes do not quite reach the posterior third of head, the terminal joint of funiculus equals the preceding two. All joints, except the second and the last two, are as broad as, or broader than, long.

Thorax narrower than head, not quite twice as long as broad at pronotum, where it is a fraction broader than at epinotum. Pronotum broader than long, broadest just behind the shoulders which are sharply angled; the anterior border straight, the posterior concave, limited by a suture which in some specimens is quite distinct, in others only indicated; mesonotum broader than long, bounded behind by traces of a suture which is practically straight. Base of epinotum similarly shaped to pronotum but inverted, and is broadest at the extreme border instead of just in front. Declivity of epinotum broad, concave from top to bottom and slightly convex from side to side, as long as, or a fraction longer than, the base, a sharp carina dividing the two. Lateral and anterior borders of pronotum, and lateral borders of epinotum, with a sharp carina. Petiole once and a half as broad as long, broader behind than in front (in *singularis* the node is broader in front), widely concave in front, its sharply marginate sides produced into broad flat teeth behind;

underneath with a small sharp tooth. Postpetiole broader than the petiole, and broader than long, broadest at its sharply marginate anterior two-thirds of the sides, narrowing abruptly behind the marginate portion; on the side is a long concavity similar to that in *singularis*. A deep constriction between the postpetiole and first segment of gaster, which are approximately equal in breadth. Pygidium truncate.

Mandibles closely and coarsely punctured. Head with a few shallow irregular punctures on the vertex and occiput; petiole and postpetiole densely and finely punctured. First segment of gaster with a few piligerous points. In addition the whole body has a fine reticulate ground-sculpture.

Scattered erect hairs on head, mandibles, legs, and antennæ; thorax almost bare except for a row along the carina between the two divisions of the epinotum; petiole, postpetiole, and gaster covered with long stiff hairs, slightly lighter in colour than the body; a thin adherent pubescence on petiole and postpetiole.

Darlington, W. Australia (Clark, no. 9). Small colony under stone.

Type W. C. C. coll.

*Leptogenys (Lobopelta) neutralis*, For. ♂ ♀.

♀ (hitherto undescribed). Length 7.0 mm.

Larger and more robust than the ♂. Head as broad as long (longer than broad in ♂). Thorax similar to that of the ♀, but mesonotum longer; metanotum distinct; epinotum shorter, forming a regular curve, the base shorter than the declivity (the reverse is the case in the ♂). Petiole different; from above the node is shorter than broad, twice as wide behind as in front, the posterior border straight or feebly concave (in the ♂ the node is longer than broad); in profile it is straight in front and behind, somewhat higher behind; the posterior face plane. Mandibles similar, with a long apical tooth and three exceedingly small teeth along the masticatory border. Gaster very large, nearly half the length of the total body.

Black, shining; mandibles, articulations of antennæ, end of scape and the whole funiculus, the tarsi, the articulations of the legs, and the apex of gaster castaneous.

Mundaring Weir, W. Australia (Clark, nos. 13, 41).

Type in W. C. C. coll.

*Rhytidoponera convexa*, Mayr, race *violacea*, For.,  
var. SUBUMBRATA, nov.

♂. Entirely dark russet-brown, the gaster sometimes

faintly metallic, but otherwise entirely without the metallic green, blue, or red of *violacea*. Gaster less shining than in *violacea*.

The posterior angles of head are somewhat less rounded, and the sculpture of the pronotum rather coarser, and the first segment of gaster distinctly more finely striated than in the type.

Townsville and Magnetic Island (*Hill*, nos. 152, 71, 77).

Type W. C. C. coll.

Mayr says of *convexa*: "Mandibulæ . . . . . margine masticatorio acuto, hand dentato, partim indistincte crenulato." Both *violacea* and var. *subumbrata* have two or three very distinct but small teeth, the spaces between them and the rest of the border bearing distinct though minute teeth.

*Rhytidoponera* (*Chalcoponera*) *aspera*, Roger.

♀ (hitherto undescribed). Length 9 mm.

Colour like the ♂, but the red is rather more predominant over the metallic green than in the ♂.

Head somewhat broader and eyes are larger than in ♂. Scape not so long proportionately. The sculpture on scutellum and scutum tends to become longitudinally rugose. Otherwise like the ♂.

Wings pale brown and iridescent.

♂ (hitherto undescribed). Length 7.5 mm.

Head and thorax black without metallic sheen, petiole and gaster red-brown, legs and antennæ and apex of mandibles castaneous.

Mandibles triangular, with a large terminal and numerous small teeth. Antennæ long, reaching beyond base of gaster. The scapes do not quite reach the back of eyes; the scape is three to four times as long as the first joint of funiculus, which is broader than long; second joint the longest, slightly longer than the apical, the joints gradually diminishing to the apical, and all of them very long and cylindrical. Eyes large, placed obliquely in centre of sides. Clypeus raised in centre and depressed along the anterior border, which is convex.

Head longer than broad, narrow in front. Occipital border slightly concave.

Thorax narrower than head, depressed in centre, Mayrian and parapsidal furrows distinct. Declivity of epinotum plane

Node from above more than twice as long as broad, the sides concave anteriorly. In profile it is depressed au-

teriorly and raised posteriorly; underneath is a sharp vertical spine, small.

Gaster long and narrow, the second segment longer than the first, and constricted between.

Wings as in ♀.

Shining. Mandibles striate; head, including clypeus, coarsely reticulate-punctate. Scutum less coarsely so; the Mayrian furrows are marked out by broad transverse shining grooves. Rest of thorax and the node coarsely reticulate-punctate, the declivity of epinotum transversely rugose. First segment of gaster faintly reticulate with a few irregular longitudinal lines, second segment more finely reticulate.

Stipites long and thin, completely encircling the rest of the genitalia.

Victoria, no. 110 (*H. M. Giles*, 1905).

Types W. C. C. coll.

*Rhytidoponera (Chalcoponera) metallica*, Sm.,  
var. *VARIANS*, nov.

♂. Length 4.5 mm.

Rather smaller than the smallest ♂ of *metallica*. Head longer and narrower, hardly wider behind than in front, sides feebly convex. Thorax less robust; node of pedicel somewhat more pointed in front. Scapes extend a little more beyond the occiput. The occiput has a feeble carina, broken in the middle, along its upper border.

Sculpture similar, except on gaster, of which the first segment is covered with transverse striæ interspersed with punctures which are larger and more numerous than is usual in the type.

The colour varies from a yellow-brown (palest on thorax), in the majority of specimens, to a metallic green on top of head and thorax and on nearly the whole of gaster. This metallic colour never reaches the depth and brilliance seen in typical specimens of *metallica*, and there is no trace of purple.

Darlington, West Australia (*Clark*, no. 40).

Type in W. C. C. coll.

According to Emery, this var. resembles the var. *cris-tulata*, For. (which I have not seen), in the shape of the occiput, but the sculpture of the gaster is quite distinct.

*Rhytidoponera (Chalcoponera) metallica*, Sm.,  
var. *INORNATA*, nov.

♂. Differs from the preceding in being of a uniform



dark yellow-brown, with no sign of metallic sheen, and in the following points:—

The head is shorter and broader behind. The node of the petiole is distinctly less pointed in front (when seen from above). The sculpture of the gaster is distinct; the first segment is coarsely and evenly semicircularly striate, the striæ forming a narrow arch in the centre near the apex of the segment. The segment has no punctures, but there is a slight emargination or notch in the apical border, which is present in all the specimens examined. The second segment is similarly striate, with a similar arching of the striæ, but the striæ are much finer than in the first segment. (In var. *varians* the second segment is much more finely and transversely striate, with no arching, and is punctured in addition.)

All the thirty-five specimens examined conform to the above description.

Perth, W. Australia (*Clark*, no. 31).

Type in W. C. C. coll.

Though hesitating to add to the varieties of such a variable species as *metallica*, I have thought it best to do so, as neither Prof. Emery nor myself could make these two forms agree with any of the published varieties.

*Odontomachus coriarius*, Mayr, var. *obscura*, nov.

(Fig. 1\*.)

♀. Length 11.5 mm. (without mandibles); mandibles 2.0 mm.

Differs from typical *coriarius* as follows:—

*coriarius*. (Fig. 2.)

(Specimen from Godeffroy Mus.)

Scapes do not quite reach occiput.

Occipital groove deep and broad.

Striation of head very even and distinct under  $\times 10$  magnification.

Pronotum evenly transversely striate.

Base of first segment of gaster longitudinally reticulate-striate; whole of second segment reticulate with several points.

var. *obscura*.

Scapes pass occiput by about half their breadth.

Occipital groove less deep and narrower.

Striation of head very fine, not distinct under  $\times 10$ .

Striation in centre of pronotum oval, with the long diameter of the oval across the segment. The whole of thorax more finely sculptured than in *coriarius*.

First and second segments only very superficially reticulate.

\* The names used in reference to the three teeth are:—*apical* tooth for the terminal, *subapical* for the smaller one following it, and *preapical* for the large broad tooth forming the innermost of the three.

In addition, the new variety is uniformly darker in colour than typical *coriarius* (Clark, no. 10).

Type W. C. C. coll.

Mayr originally described *coriarius* as a species, but later authors have considered it a race of *ruficeps*. It should rank as a species for the following reasons:—There has been a certain amount of confusion among authors, owing to the brevity of Smith's description of *ruficeps*. I have recently examined the type, of which I give a description below, and there is no doubt that Smith's description has led to errors. The shape of the head is quite unlike that of *coriarius*, being somewhat long and only slightly wider in front than behind. Further, the preapical tooth is nearly

Fig. 2.

Fig. 1.



Fig. 1.—Mandible of *O. coriarius*, var. *obscura*, nov.

Fig. 2.—Mandible of *O. coriarius*, Mayr.

as long as the apical, and is not sharply truncate, as in *coriarius* (*vide* fig. 2). Smith in his description says the teeth are "stout and blunt," which hardly conveys the appearance of the teeth in the type. In fact, Forel, relying on these words, has described a race of *ruficeps*, which he called *acutidens* (Ann. Soc. Ent. Belg. xliv. p. 56, 1900). As a further result of the examination of Smith's type and the discovery of a ♀ major of *acutidens*, the latter will have to rank as a species.

### *Odontomachus ruficeps*, Smith. (Fig. 3.)

Type (British Museum).

♀. Length (without mandibles) 12.8 mm.; mandibles 2.2 mm. Length of head 3.7 mm.; width of eyes 2.8 mm.; width at occiput 2.1 mm.

Colour ferruginous.

Mandibles toothed along inner border with 9–10 small teeth. Apical tooth slightly longer than preapical (*vide* fig. 3).

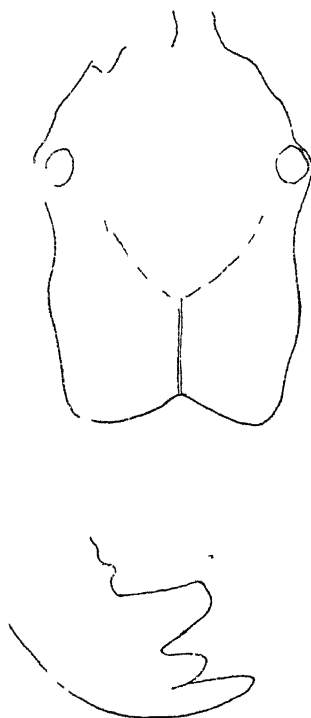
Head not greatly wider in front than behind.

Spine of node slightly curved backwards. Node in profile straight in front, rounded behind.

Whole of head above and below, including the fossæ, finely striated right up to the occiput. The occipital groove extends from the edge of the depression to the occiput, deep.

The striæ on top of pronotum in front are spiral, on the hinder part they are transverse. On the rest of thorax they are transverse, much coarser on the base of epinotum. The declivity has a few coarse transverse striæ.

Fig. 3.



Head and end of mandible of *Odontomachus rugiceps*, Sm., type.

Back of node quite smooth, the front has transverse striæ.

Gaster microscopically reticulate.

Forcl's race *acutidens* (*l.c.* and *Ann. & Mag. Nat. Hist.* ser. 9, vol. vii. p. 90, 1921) varies in length from 7.5 to 10.0 mm. or more, the largest ♂ almost deserving the name of "soldier."

The following table, giving the comparative dimensions of the heads of these five forms, shows at a glance how they are related (that of *coriarius* is taken from an example kindly given me by Emery, and came from the Godeffroy Museum):—

	<i>ruficeps</i> , type.	<i>septentrionalis</i> , co-type. (Fig. 4.)	<i>coriarius</i> .	var. <i>obscura</i> .
Length.....	3.7 mm.	3.9 mm.	3.3 mm.	3.4 mm.
Width at eyes. . .	2.8 "	2.7 "	2.5 "	2.5 "
Width at occiput .	2.1 "	2.0 "	2.0 "	2.0 "

	<i>acutidens</i> . (Fig. 5.)	<i>cephalotes</i> , Sm., type. (Fig. 6.)
Length.....	♀ major 3.3 mm.    ♂ minor 2.2 mm.	3.3 mm.
Width at eyes....	" 2.7 "	2.5 "
Width at occiput .	" 2.1 "	1.4 "

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 4.—Mandible of *O. septentrionalis*, Craw.Fig. 5.—Mandible of *O. acutidens*, For.Fig. 6.—Mandible of *O. cephalotes*, Sm., type.

It will be seen from the above measurements that *ruficeps* and *septentrionalis* approximate very closely in the shape of the head, that of *septentrionalis* being very slightly longer and narrower. In fact, the only difference between the two forms, apart from this, lies in the shape of the mandibular teeth. The dimensions of the heads of *coriarius* and its var. *obscura* are almost identical.

*O. coriarius*, therefore, should rank as a species distinct from *ruficeps*, while *septentrionalis* can only be considered a var. of *ruficeps*. On the other hand, *acutidens* differs from the others in having a shorter and proportionately broader head, and also in possessing two forms of ♀, and should rank as a distinct species.

Emery has seen the var. *obscura* and *septentrionalis*, and agrees with me that *ruficeps* must be considered as a species distinct from *coriarius*, *cephalotes*, *ajax*, and *acutidens*.

*O. cephalotes*, Sm., as shown by the measurements of the head and the shape of the mandibular teeth, comes in the *coriarius* group. Below is a description of the type (Oxford) from Ceram :—

♂. Length (without mandibles) 11.3 mm.; length of mandibles 1.7 mm.

Head as above. Mandibles broad, distinctly but irregularly denticulate along inner border (Smith says "no teeth"), apex with three teeth (*vide* fig. 6). Clypeus prolonged in a blunt point between the frontal carinæ. Antennal scapes barely extend beyond occipital border. Occipital groove extends to end of antennal fossæ, deepest anteriorly. Thorax slightly emarginate between meso- and epinotum. Node broad at base, narrowing gradually to the spine, which is rather short and thick.

Mandibles with one or two indistinct punctures near the apical tooth, very faintly and irregularly striate along their outer half. Whole of upper surface and sides of head finely and regularly striate, the striæ coarser in front and spreading fan-wise from the frontal carinæ to the base of eyes, and diverging slightly on the vertex.

Pronotum finely striate transversely, anteriorly some of the striæ form concentric ovals (this cannot be seen from above, but only from the sides); mesonotum with feeble striæ, arched anteriorly; epinotum regularly and transversely striate.

Node encircled with fine striæ.

Entire gaster finely and longitudinally striate, and finely reticulate at the base of each segment. On the first segment the lateral striæ encircle the basal half of the segment, so that this half, viewed from in front, appears to be transversely striate.

A few outstanding hairs on pronotum and gaster, particularly on the apical segments. Pubescence very scanty.

Dark ferruginous, almost fuscous; mandibles, antennæ, and legs paler, gaster darkest.

One of the co-types from Ceram is paler.

*Podomyrma NUDA*, sp. n. (Fig. 7.)

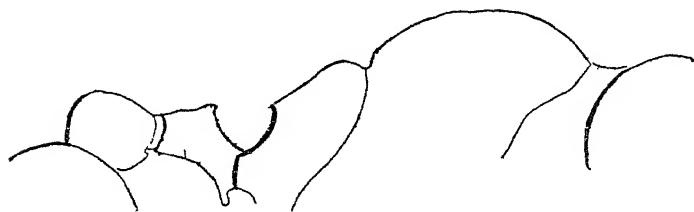
♂. Length 5.5 mm.

Dark red-brown; femora, tibiæ, and gaster dark brown. A few scattered yellow hairs on body, tibiæ, and scapes with a few erect hairs. Pubescence nil.

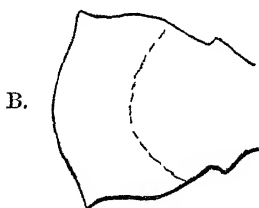
Head very slightly longer than broad, somewhat wider behind where the occiput is feebly concave, the sides slightly

convex, the occipital angles broadly rounded. Mandibles thick, with two large apical teeth followed by three or four smaller ones. Anterior half of clypeus flat, depressed along the anterior border, which is straight. Frontal carinæ feebly dilated at the insertions of the antennæ, about one-third as long as the scape. A ridge continues them to the vertex. The space between the eyes and the frontal carinæ is slightly raised, so as to give the impression of an antennal scrobe at each side, though a definite scrobe does not exist. The scapes fail to reach the occiput by over twice their greatest

Fig. 7.



A.



B.

*Podomyrma nuda*, sp. n.

A. Thorax and petiole.

B. Dorsum of thorax.

diameter. The apical joint of the club, which is very distinctly 3-jointed, is almost as long as the two others together. Joints 2-6 of funiculus subequal, slightly longer than broad, the fifth and sixth somewhat thickened, the seventh still more so and longer.

Pronotum broader than long, the sides convex posteriorly, then becoming concave towards the anterior angles, which are triangular, but not, strictly speaking, dentate. Promesonotal suture indicated by a slight break in the sculpture. The mesonotum a little below the halfway line has a blunt projection on each side directed forwards.

Mesoepinotal constriction deep. Base of epinotum, which is nearly twice as long as the declivity, is in profile rounded as it rises from the suture, then flat for the rest of its length. Declivity concave, separated from the base by a transverse ridge ending in a point on either side. First joint of pedicel from above longer than broad, the sides parallel, the node ending in front in a blunt point; in profile the joint is divided into two halves by the point, in front of this point it is concave, beyond plane. Underneath is a blunt tooth directed forwards. Second joint once and a half as wide as first, broader than long, with convex sides, in profile it is higher behind, where it is rounded and higher than first joint. Underneath in front is a blunt tooth.

Femora very swollen. Gaster ovate.

Back of head and thorax shining, front of head and gaster mat. Mandibles closely striate. Clypeus sub-mat, with two or three strong ridges at the sides and some indistinct ones in between. Head closely and evenly longitudinally striate. On the cheeks the striæ tend to become coarse reticulations. There is a reticulate ground-sculpture between the striæ, except on the vertex and occiput, which are shining between the striæ. Promesonotum coarsely longitudinally rugose and shining, likewise the sides. First half of base of epinotum irregularly transversely rugose, second half regularly so. Declivity shining. First node irregularly rugose, second evenly longitudinally rugose. Base of gaster with fine, longitudinal, short striæ, the rest superficially reticulate.

1 ♂. Murray River (*Clark*, no. 150).

Type W. C. C. coll.

Comes near *inermis*, Mayr, differing in size and colour and some small structural details, and also in the sculpture. According to Forel's description, it also comes near *odæ*, which I have not seen.

*Meranoplus hirsutus*, Mayr, race *RUGOSA*, st. n.

♂. Length 2.8 mm.

Comes near the race *minor*, Forel, from which it differs chiefly in the shape of the thorax.

Entirely castaneous, petiole somewhat darker, teeth of mandibles and eyes black.

Mandibles with four teeth. Head broader than in *minor* and proportionately broader behind.

Promesonotum broad, much broader behind than in

*minor*; the lateral spines are connected almost to their points with a translucent border; the mesonotal spines are subequal, pointed, not truncate at their ends as in *minor*. The epinotal spines are long and pointed, but rather thicker than in either *hirsutus* or race *minor*. First node rather higher than second, otherwise similar to that of *hirsutus*. Second node in profile somewhat shorter and more abruptly descending at the posterior border than in *hirsutus*, and seen from above it is slightly shorter.

Pilosity abundant, but rather shorter than in type or race *minor*.

Mandibles striate. Head and thorax, instead of being coarsely reticulate, are coarsely longitudinally rugose, the rugæ being connected here and there by transverse bars. Petiole coarsely reticulate-rugose. Base of gaster longitudinally rugose like the thorax, but not so coarsely. In the type it is finely reticulate, and in race *minor* smooth and shining.

Parkerville, W.A. (*J. Clark*, no. 29).

Type W. C. C. coll.

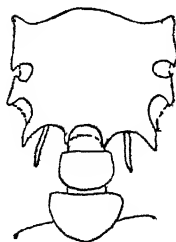
*Meranoplus* FERRUGINEUS, sp. n. (Fig. 8.)

♂. Length 2·8–3·0 mm.

Entirely ferruginous; teeth of mandibles dark brown.

Whole body abundantly provided with a moderately long golden-brown pilosity.

Fig. 8.



*Meranoplus ferrugineus*, sp. n.

Mandibles with four teeth. Head about as long as broad, broadest at occiput, where it is slightly concave. Eyes behind the middle of sides of head. Centre of clypeus concave from side to side, the anterior border widely emarginate.



Thorax in shape not unlike the preceding, with similar triangular teeth at the shoulders of pronotum, but the spines are shorter. It is broader than long, not greatly wider in front than behind, the spines are subequal, the lateral pairs joined by a translucent border. The posterior central pair are slightly shorter than the outer ones. Epinotal spines long and thin.

Both nodes in profile subquadrate; from above the first is subquadrate, the second nearly  $1\frac{1}{2}$  as broad, broadest and almost straight in front, narrowing in an even curve behind, the whole being not unlike a half-moon with the points rounded. Gaster of ordinary form.

Mandibles striate. Clypeus smooth and shining in centre, striate at sides. Frontal area smooth and shining. Front half of head with irregular longitudinal ridges, shining in between, merging as the front is reached into coarse reticulation, until at the occiput the sculpture consists of more or less hexagonal pits, shining at the bottom.

On the promesonotum the process is reversed, the pits being in front and the ridges behind. The petiole is similarly pitted.

Gaster smooth and shining, but superficially reticulate.

Serpentine River, W.A. (*J. Clark*, no. 35).

Type W. C. C. coll.

CHANGE OF NAME.—*Meranoplus minor*, Crawley (1918), cannot stand, as there is already a *M. hirsutus*, race *minor*, Forel (1902). I therefore propose the name *M. minimus* for the former.

*Meranoplus* HILLI, sp. n. (Fig. 9.)

♂. Length 2.8 mm.

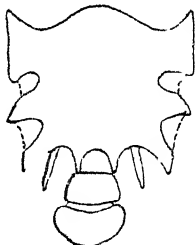
Entirely ferruginous.

Head as long as broad, widest behind, slightly narrowing in front, less so than in *ferrugineus*, posterior border concave. Front portion of clypeus slightly concave, the anterior border almost straight. Mandibles with four teeth. Frontal carinae slightly curving in at level of eyes, which are well behind the middle of head. Antennal scape swollen beyond middle; club of funiculus longer than the rest of the funiculus.

Promesonotum considerably broader than long, broadest in front. Shoulders of pronotum terminated by large triangular teeth, the sides parallel, with a blunt dentiform

process equal and opposite to the pronotal teeth, scooped out at base leading to the mesonotum, the interval covered with a translucent membrane. The mesonotum has three pairs of teeth, the anterior lateral ones broad, the posterior lateral ones longer and pointed, the central pair short and pointed. A translucent membrane covers the excavated space between. Epinotum broad and flat, bearing a pair of long pointed spines, nearly as long as their interval, and directed slightly outwards. First node in profile twice as high as thick, a fraction higher in front than behind, straight in front, slightly concave behind, making the base broader than the apex. From above it is broader than long, straight in front, roughly convex behind. Second node in profile as high as first, and thicker from above, broader than first, concave in front, convex behind.

Fig. 9.

*Meranoplus hilli*, sp. n.

Gaster of normal form.

Body moderately provided with a short brown pilosity, much less abundant than in *ferrugineus*.

More or less shining, gaster sub-mat. Mandibles striate. Clypeus smooth and shining with a few striae on sides and on anterior portion. Front half of head has longitudinal ridges, which gradually become coarse reticulations until at the occiput the surface is merely coarsely reticulate. Sculpture of thorax similar to that on the occiput, sides longitudinally striate. Epinotum with a few longitudinal striae. Both nodes coarsely reticulate-punctate. The bottom of the punctures and areas enclosed by the reticulation are shining.

Gaster entirely microscopically reticulate and sub-mat.

Similar to *ferrugineus*, from which it differs principally in shape of head and in sculpture, and in pilosity.

Scaford, Victoria (*W. Hill*, no. 84).

Type W. C. C. coll.

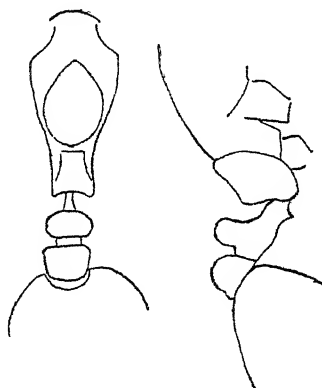
*Monomorium OCCIDANEUS*, sp. n. (Fig. 10.)

♂. Length 2.0 mm.

Pale yellow, thorax and legs palest, gaster castaneous. Teeth of mandibles brown. Body sparsely provided with yellow hairs.

Head almost exactly as broad as long, broadest in front, slightly narrowing behind eyes, sides almost parallel to that point, occiput widely concave. Eyes of moderate size, placed just in front of middle of sides. Mandibles with four teeth. Clypeus overhanging base of mandibles, the

Fig. 10.



*Monomorium occidaneus*, sp. n.

carinae not very distinct, the projecting portion feebly incised in centre of anterior border. Scapes fail to reach the occiput by twice their greatest width. Apical joint of club nearly twice as long as the other two together, the first joint of club is longer than broad, two-thirds as long as the second; joints 2-6 of funiculus broader than long, the seventh as broad as long.

Thorax slightly constricted in centre, very similar to that of *latinode*, Mayr, but the mesonotum forms an acute angle in front, the promesonotal suture being feeble but distinct. Mesoepinotal suture as in *latinode*. Base of epinotum once and a half as long as declivity, the angle dividing them greater than a right angle, slightly concave, with prominent but blunt angles at the sides. First node in

profile higher than second, rounded evenly at the top, not greatly thicker at base than at apex; stem as long as the node, with a minute tooth in front below. Second thicker than first, more or less globular in appearance. From above, the nodes are equally broad, the first and second as broad as long, the anterior and posterior borders almost straight and parallel. Second node somewhat broader than long, convex behind, straight in front. Base of gaster concave.

Shining; mandibles with a few punctures, clypeus with a few longitudinal lines, frontal area with a few striæ, which continue up to nearly the half of the scape, spreading outwards. Antennal fossæ contain a few circular striæ. Whole of head has widely spaced distinct pits. Thorax with a few indistinct points. Base and declivity of epinotum finely transversely striate, the sides reticulate. Petiole and gaster smooth and shining.

♀. Length 3·7 mm.

Deälate. Dark castaneous brown, abdomen lighter than head and thorax; mandibles, clypeus, antennæ, and legs pale castaneous.

Pilosity sparser than in ♂.

Similar to ♀, except for size and sexual differences.

The head is as broad in front as behind, the sides feebly convex, occipital border feebly concave. Eyes large, situated as in ♂.

Base of epinotum slightly shorter than declivity, concave between the angles, which are more prominent than in the ♂. Both nodes proportionately broader and shorter than in ♂; the second below broadens out into two angles in front; the first bears a small point beneath as in the ♂. Gaster long and narrow.

Shining; striation of head similar to that of the ♂, but the longitudinal lines continue beyond and spread out over the ocelli, leaving a shining space each side of the frontal groove, which is well-defined. The clypeus has a few striæ on central raised portion. The thorax has more abundant punctures than in the ♂, and the sides of the petiole and nodes are reticulate-striate. Epinotum transversely striate.

Swan River, W. Australia (*Clark*, no. 95).

Types W. C. C. coll.

LV.—*Annélides Polychètes de l'Expédition de l'Université d'Oxford au Spitzberg en 1921*. Par PIERRE FAUVEL, Professeur à l'Université catholique d'Angers.

CETTE petite collection, comprenant 24 espèces, dont aucune n'est nouvelle, a été recueillie à la côte, à mer basse, ou dans des dragages côtiers. La plupart des spécimens proviennent de Klaas Billen Bay, quelques-uns seulement d'Advent Bay ou de Prince Charles Foreland.

### Aphroditidæ.

#### *Harmothoe imbricata* (Linné).

Klaas Billen Bay et Prince Charles Foreland, No. 4 et No. 7 Richard Lagoon.

Les spécimens sont très nombreux et de très grande taille, certains dépassent la longueur de 4 à 5 centimètres. Leur coloration est très variée. Quelques-uns appartiennent à la variété caractérisée par une large bande longitudinale marron, tandis que le reste des élytres est incolore.

#### *Lagisca rarispina*, Malmgren.

Klaas Billen Bay.

Des deux spécimens, l'un est de petite taille, tandis que l'autre mesure 60 mill. sur 18 mill., soies comprises. Les élytres sont marbrées de brun avec plusieurs rangs de longues papilles brunes cylindriques. Les 7 à 8 derniers sétigères semblent régénérés.

#### *Pholoe minuta*, Fabricius.

Klaas Billen Bay.

Ces spécimens de petite taille ont été ramenés par la drague.

### Syllidæ.

#### *Syllis fasciata*, Malmgren.

Klaas Billen Bay.

Cette espèce a le corps court et trapu. Les bandes transversales des segments, plus ou moins décolorées par l'alcool, ne sont plus que faiblement visibles.

\* Results of the Oxford University Expedition to Spitsbergen.—No. 7.

*Syllis cornuta*, Rathke.

Klaas Billen Bay.

D'après Augener\* (1913, p. 171), *Syllis* (*Ehlersia*) *sevoculata*, Ehlers, contrairement à ce que l'on admettait, ne serait pas synonyme de *Syllis cornuta*. Chez cette dernière espèce, il y aurait passage graduel des soies à long article en alène aux soies à serpe relativement courte; elles seraient nettement bidentées à l'extrémité. Chez l'*Ehlersia sevoculata*, les articles en alène seraient plus minces, plus allongés, très indistinctement bidentés et il n'y aurait pas de passage graduel des articles en alène aux serpes plus courtes.

Sur les spécimens du Spitzberg, j'observe bien en effet ce passage graduel, mais les articles en alène sont très longs, très minces et très indistinctement bidentés. Même sur les serpes relativement courtes, ce dernier caractère est peu marqué. Sur des spécimens de Monaco et d'Arcachon, le passage des alènes aux serpes est moins graduel et ces articles sont un peu plus nettement bidentés. Les cirres dorsaux sont peut-être aussi un peu plus courts. Mais lorsque l'on connaît la variabilité des cirres et des soies chez les Syllidiens on peut se demander si d'aussi minces détails ont une valeur spécifique.

## Hesionidæ.

*Castalia* sp. (?).

Klaas Billen Bay, dragage.

Avec les *Pholoe minuta*, la drague a ramené un petit Hésionien long de 2.5 mill., sur 2 mill., soies comprises. La trompe inerme est bordée d'une douzaine de papilles saillantes. Les yeux sont au nombre de 4. Les cirres tentaculaires sont tombés. Il semble y en avoir eu 6 paires. Les cirres dorsaux, dont il ne reste que quelques-uns, sont formés de 4 articles. Les parapodes sont en très mauvais état; ils semblent biramés, car il y a un faisceau de soies dorsales capillaires simples et des soies ventrales composées à long article. Bien que les soies dorsales soient plus développées qu'elles ne le sont d'ordinaire chez les *Castalia*, je pense que ce spécimen pourrait bien en être une forme jeune, mais son mauvais état ne permet pas de le déterminer avec certitude.

\* "Beitrag zur Kenntniss verschiedener Anneliden," Archiv für Naturgeschichte.

**Phyllodocidæ.**

*Eteone longa* (Fabricius).

*Eteone arctica*, Malmgren.

Klaas Billen Bay.

Un petit spécimen, fixé à l'alcool à 70°, et l'autre plus grand, fixé au liquide de Bouin, correspondent bien à l'*Eteone longa* dont Bergström a donné la synonymie et précisé les caractères.

*Eumida sanguinea* (Ersted).

Klaas Billen Bay.

Un petit spécimen.

**Nereidæ.**

*Nereis zonata*, Malmgren.

Klaas Billen Bay.

Un gros spécimen est un mâle à l'état subépitoke, les lamelles pédieuses sont déjà développées les soies natatoires commencent à sortir, mais les soies atokes ne sont pas encore tombées. Les spécimens atokes, grands ou petits, présentent encore bien nettement les bandes rougeâtres transversales qui ont valu à cette *Nereis* son nom spécifique. Une petite possède seulement 2 paragnathes à un groupe VI. de la trompe et 4 assez gros à l'autre. Sous ce rapport, elle se rapproche de la *N. pelagica*, et ses bandes dorsales sont peu marquées. Mais par ses groupes VII.-VIII., et tous ses autres caractères, c'est bien une *N. zonata*.

**Nephtydidæ.**

*Nephtys ciliata* (O. F. Müller).

Klaas Billen Bay, dragage côtier.

Trois grands exemplaires bien typiques.

**Eunicidæ.**

*Lumbriconereis fragilis* (O. F. Müller).

Klaas Billen Bay.

Nombreux spécimens de petite taille et en fragments plus ou moins macérés.

Cette espèce ne se distingue de la *L. impatiens*, Claparède,

si commune sur nos plages de la Manche, que par ses acicules noirs et ses crochets apparaissant à un sétigère un peu plus éloigné de la tête. Il est souvent difficile de les distinguer l'une de l'autre, et Southern, qui a trouvé en Irlande des spécimens intermédiaires, pense que l'avenir montrera leur identité. Je partage son avis sur ce point.

### Ariciidæ.

#### *Scoloplos armiger* (O. F. Müller).

Klaas Billen Bay.

Ces deux petits spécimens possèdent, à la fois, des soies capillaires et de grosses soies aux pieds antérieurs. D'après de Saint-Joseph, seuls les exemplaires des mers arctiques, dépourvus de grosses soies à la région antérieure, seraient des *Scoloplos armiger* et il désignait sous le nom d'*Aricia mülleri* ceux qui possédaient ces grosses soies. M'Intosh ayant fait remarquer que ces soies ne sont que des formes, modifiées par usure, des longues soies fines, j'avais réuni de nouveau l'*A. mülleri* au *Scoloplos armiger*. En 1914, Eising, dans son volumineux mémoire sur les Ariciens, admet également cette identité. La question semble donc tranchée.

### Spionidæ.

#### *Spio filicornis* (O. F. Müller).

Klaas Billen Bay, dragage côtier.

Ces spécimens correspondent bien à la description et aux figures de Malmgren. Le prostomium est tantôt entier, tantôt légèrement échancré, comme le figure Malmgren. Il est, ainsi que la face dorsale des premiers segments, pigmenté de taches brunes qui semblent correspondre aux organes ciliés.

D'après Söderström\* *Spio martinensis*, Mesnil, est identique à *Sp. filicornis*. Les spécimens du Spitzberg ne me paraissent pas différer, en effet, de ceux des environs de Cherbourg et ils correspondent bien aux figures de Mesnil. Aux sétigères antérieurs et moyens, la lamelle dorsale se relie à la branchie par un repli, de sorte qu'elle peut tour à tour paraître soudée ou détachée, suivant la façon dont elle est vue.

\* 'Studien über die Polychatenfamilie Spionidæ' (Uppsala, 1920).



**Cirratulidæ.**

*Chætozone setosa*, Malmgren.

Klaas Billen Bay.

Ces deux spécimens, tronqués postérieurement, ont de longues soies capillaires. L'un d'eux, cependant, possède encore un de ses gros palpes. Si ces organes manquent souvent c'est donc à cause de leur fragilité et non par épitokie, puisqu'ils coexistent avec les longues soies.

**Flabelligeridæ.**

*Flabelligera affinis*, Sars.

Klaas Billen Bay, dragage côtier.

Un spécimen.

**Opheliidæ.**

*Ophelia limacina*, Rathke.

Prince Charles Foreland, No. 4.

Un beau spécimen comptant 10 sétigères antérieurs, 23 paires de branchies et 4 segments abranches. Le tube anal se termine par 2 grosses papilles ventrales et 9 petites.

**Capitellidæ.**

*Capitella capitata* (Fabricius).

Klaas Billen Bay, dragage côtier; Prince Charles Foreland, No. 7.

Nombreux spécimens de grande taille.

**Ampharetidæ.**

*Sabellides borealis*, Sars.

Klaas Billen Bay.

Un petit exemplaire de 7 mill.

Le prostomium triangulaire porte 2 yeux. Les tentacules sont pennés. Les sétigères thoraciques sont au nombre de 14 dont le premier possède de longues soies très fines, à hauteur des branchies. Celles-ci sont au nombre de 4 paires. La quatrième paire est en arrière des trois autres. Je ne

réussis pas à distinguer de palées. Hessle en mentionne de très petites chez la *S. octocirrata*, il ne parle pas de celles de *S. borealis*.

### Terebellidæ.

#### *Amphitrite* (?) spec.

Klaas Billen Bay.

Ce n'est qu'avec beaucoup de doutes que je rapporte au genre *Amphitrite* deux petits Térébelliens tronqués, ayant perdu leurs branchies et en assez mauvais état. L'un d'eux possédait au moins 29 sétigères thoraciques, il est tronqué au 30°. Les soies capillaires sont géniculées et nettement dentelées à l'extrémité. Les uncini ont une base courte, un vertex élevé, à nombreuses rangées de denticules très fins.

#### *Terebellides stræmi*, Sars.

Klaas Billen Bay ; Advent Bay, No. 3.

Plusieurs de ces Térébelliens sont encore renfermés dans leur épais tube de vase.

#### *Polycirrus medusa*, Grube (= *Eureutho smitti*, Malmgren).

Klaas Billen Bay.

Nombreux spécimens de grande taille.

#### *Trichobranthus glacialis*, Malmgren.

Klaas Billen Bay.

Un spécimen.

#### *Laphania boeckii*, Malmgren.

Klaas Billen Bay.

L'unique spécimen recueilli de cet étrange Térébellien est typique et répond bien à la description de Malmgren.

### Sabellidæ.

#### *Chone duneri*, Malmgren.

Klaas Billen Bay.

Cette espèce possède une collerette à bord nettement oblique. Les branchies se terminent par un long filament nu, limbé à la base.

## PROCEEDINGS OF LEARNED SOCIETIES.

## GEOLOGICAL SOCIETY.

November 9th, 1921.—Mr. R. D. Oldham, F.R.S.,  
President, in the Chair.

The following communications were read:—

1. 'The Igneous and Associated Rocks of Llanwrtyd (Brecon).'  
By Laurence Dudley Stamp, D.Sc., A.K.C., F.G.S., and Sidney  
William Wooldridge.

## PART I—STRATIGRAPHICAL (L. D. S.).

The igneous rocks of Llanwrtyd occupy the core of the Towy Anticline of Central Wales for a distance of about 2 miles. The succession proved is as follows:—

- [(7) Intrusion.]
- (6) Black Slates, cleaved and poorly fossiliferous.
- (5) The Upper Ashes  $\left\{ \begin{array}{l} \text{Fossiliferous ashy shales.} \\ \text{Fine banded ashes.} \\ \text{Coarse ashes.} \end{array} \right.$
- (4) Hardened mudstones with a band of ashy limestone.
- (3) The Spilites and Spilite-Breccias.
- (2) Hardened sediments with fossiliferous mudstones.
- (1) The Lower Ashes and Breccia.

The fossils from the lower horizon (2) include *Dicranograptus rectus* Hopkinson, *Glyptograptus teretiusculus* var. *siccatus* Elles & Wood, and *Olimacograptus scharenbergi* Lapworth. Those from the higher horizon (5) include *Dicellograptus sextans* Hall and var. *exilis* Elles & Wood, and *Glyptograptus teretiusculus* var. *siccatus* Elles & Wood. Both assemblages are characteristic of the *Dicranograptus* Shales of South Wales, especially of the horizon of the Mydrim Limestone. The volcanic rocks of Llanwrtyd are therefore of lowest Bala (Survey classification) or highest Llandeilo (classification of Miss G. L. Elles) age, and on the same horizon as the Upper Basic and Upper Acid Series of Cader Idris. It had previously been suggested that the Llanwrtyd rocks were of the same age as those at Builth, 10 miles away, which are Llanvirnian.

A detailed description of the beds is given, as well as an account of the more important sections, and a comparison with other parts of Wales. The igneous rocks are cut off on the west by a fault, into which an intrusive mass appears to have been forced.

2. 'The Base of the Devonian, with especial reference to the Welsh Borderland.' By Laurence Dudley Stamp, D.Sc., A.K.C., F.G.S.

This paper is an attempt to establish a satisfactory base for the Devonian System, on a basis which shall serve for international correlation. The classification adopted is as follows:—

LOWER DEVONIAN (OLD RED	{	II. Dittonian.
SANDSTONE FACIES.)		I. Downtonian.
SILURIAN (GOTLANDIAN)	.. {	III. Ludlovian.
		II. Wenlockian.
		I. Valentian.

Murchison, in defining the Silurian System, drew the limit between it and the Old Red Sandstone below the Downton Castle Sandstone or Tilestones. He afterwards included the latter in the Silurian, and later writers have grouped still higher beds as Silurian. It is proposed to return to the original definition of Murchison. The Ludlow Bone-bed forms a natural base: it consists of fish-remains, all of which first appear at this horizon, and are genetically connected with higher Devonian faunas; it passes laterally into a conglomerate, and thus forms a natural physical base; it marks a palæontological and lithological break which can be correlated all over North-Western Europe. Typical sections are described in detail.

A study of the palæontology of the Downtonian of the Welsh Borderland shows that the fauna of the lower beds (Ludlow Bone-bed, Downton-Castle Sandstone, and *Platyschisma* Shales) falls into three groups:—

(a) Upper Ludlovian marine species which survived the change of conditions indicated by the bone-bed, and lived on in diminished numbers, but gradually die out. The *Platyschisma* Shales of Clun Forest are of deeper-water type than the Downton-Castle Sandstone, and still other marine forms occur.

(b) Species which flourished for a short time under the changing conditions.

(c) New forms—chiefly fishes—which persist, or are closely connected with later Devonian forms.

A comparison is made between the succession in the Welsh Borderland and various other regions:—Scotland, Devon and Cornwall, Northern France, the Ardennes, Brittany, Portugal, the Baltic lands, Spitsbergen, and North America.

Some notes on the Downtonian palæogeography of England are added, and some remarks on the habitat of Devonian fishes. It is suggested, from the association of the early Downtonian fishes with marine invertebrates that they could live in either salt or brackish water, but gradually became specialized—some for a lacustrine habitat, others, perhaps, for marine conditions.

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LVI.—*A Preliminary List of the Arctiinae of Pará, Brazil, and a few from other Localities.* By Lord ROTHSCHILD, F.R.S., Ph.D.

THE material of the subfamily Arctiinae on which this list is founded forms part of very extensive collections made at Pará by the Rev. A. Miles Moss, English Chaplain there. A considerable number were bred, but the larger series were taken either on the electric lights of the town of Pará or the special lamps used by Mr. Moss for attracting Heterocera.

1. *Thyractia cedo-nulli* (Stoll).

*Phalena cedo-nulli*, Stoll in Cramer, Pap. Exot. vol. iv. part xxix. p. 108, pl. cccxvi. figs. A, B (1781) (Surinam).

2 ♂ ♂ and 2 ♀ ♀ bred, 4 ♂ ♂ caught.

2. *Gonotrepes friga* (Druce).

*Thyractia friga*, Druce, Ann. & Mag. Nat. Hist. (7) xvii. p. 406 (Carabaya).

1 ♂ caught.

3. *Zevius calocore*, Dyar.

*Zevius calocore*, Dyar, Zoologica, N.Y. vol. i. p. 126, pl. lxi. no. 3 (1910) (Hoorie, British Guiana).

[The ♀ of this species has not yet been described. It differs from the ♂ in being much larger, the fore wings are  
Ann. & Mag. N. Hist. Ser. 9. Vol. ix. 30

wider in proportion to the length (♀, length of fore wing 22.5 mm., width 12.5 mm.; ♂, length 15 mm., width 8.5 mm.), and the costa near the base is produced into a lappet-like convex projection; the hind wings are large with apex produced into a point, not small and round as in the ♂; the colour is salmon-pink, entirely opaque, being densely scaled. ♀ described, Fonte Boa, Amazons, Sept. 1906 (*G. M. Klages coll.*).]

1 ♂ caught.

4. *Robinsonia mossi*, sp. n.

♂. Pectus white; palpi, frons, and vertex yellow; patagia buff; rest of thorax and abdomen pure white.

Fore wing semihyaline white, nervures whitish grey, costa and terminal fifth of wing sooty mouse-grey; hind wings semihyaline white.

Length of fore wing 18 mm.; expanse 40 mm.

1 ♂ type caught.

5. *Robinsonia rockstonia*, Schaus.

*Robinsonia rockstonia*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 206 (1906) (Essequibo, British Guiana).

1 ♂ caught.

6. *Robinsonia dewitzi*, Gundl.

*Robinsonia dewitzi*, Gundlach, Contr. Entom. Cuba Lepid. i. p. 265 (1881) (Cuba).

8 ♂♂, 1 ♀ caught.

7. *Idalus neja*, Schaus.

*Idalus neja*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 208 (1906) (St. Jean de Maroni).

This insect shows great variation in size; the majority from the Guianas are small, but a few equal in size the Brazilian specimens, which appear to be mostly large.

Length of fore wing, ♂: St. Jean de Maroni (smallest), 18 mm., expanse 41 mm.; Pará (largest), 23 mm., expanse 53 mm.

The undescribed ♀ is much larger, and differs from the ♂ in the much broader, more brightly coloured, and much more rounded fore wings, and in the larger and more rounded hind wings.

4 ♂♂, 1 ♀ caught.

8. *Idalus pandama* (Druce)

*Halusidota pandama*, Druce, Proc Zool Soc Lond 1893, p 288, pl vii fig 8 (R Songo, Bolivia)

1 ♂, 1 ♀ caught.

9 *Idalus admirabilis* (Cram).

*Phalæna admirabilis*, Cramer, Pap Exot vol ii. pt ix p 11, pl ciii fig G (1777) (Siam)

It is more than probable that what we at present call *Idalus admirabilis* is composed of a conglomeration of several species, but, without the examination of the genitalia of a large series of specimens from a variety of localities, this can only be surmised.

There are individuals with and without the dark spot above vein 5, others with deep rose hind wings, some with white hind wings, etc.

The ♀ in the present series has white hind wings, no spot above vein 5, and an almost straight median band, while the ♂♂ all have the spot, have hind wings of varying shades of rose, and a strongly-curved median band.

13 ♂♂, 2 ♀♀ caught.

10. *Idalus daga* (Dogn.).

*Empusa daga*, Dognin, Le Nat 1891, p 125 (Zumba)

All the three examples are of the typical form with yellow abdomen.

Formerly I sank the red-abdomened form *dares*, Druce, to the rank of an aberration, in view of the series of specimens at Ting from Las Quiguas, Venezuela, consisting of individuals with brick-red abdomen as well as yellow. Apparently, however, specimens with yellow abdomen do not occur in Costa Rica and Ecuador, nor do individuals with deep crimson abdomen occur in Eastern S. America. Therefore, either *dares* must be treated as a subspecies of *daga* or as a good species: only the examination of the genitalia can decide which.

1 ♂, 2 ♀♀ caught.

11. *Idalus mossi mossi*, sp. n.

♂ Closely allied to *melanopasta*, Dogn., but differs in the shape of the claspers. Externally the apex of fore wing is more produced and the outer half of wing is less fiedled, the hind wing has the apex produced to a sharp point, and the

abdominal half of the wing is deep uniform rose acutely cut off from the pale costal half.

Length of fore wing 18 mm.; expanse 41 mm.

1 ♂ caught.

[*Idalus mossi fluviatilis*, subsp. n.

♂. Differs from *mossi mossi* in being much paler in colour, in the large tooth running into the yellow terminal area of fore wing being reduced to a point, and in the hind wing being entirely sericeous buffy cream-grey with only a slight rose tint on the hairs of abdominal half.

♀. Differs from ♂ in being much darker and having the hind wings large and normally developed and uniform rose-colour throughout.

2 ♂♂, 2 ♀♀, Fonte Boa, Upper Amazons, Aug. 1907 (*S. M. Klages coll.*); 1 ♀, Manaus-Yutshi (*Maxwell Stuart*).]

## 12. *Idalus favillacea* (Rothsch.).

*Automolis favillacea*, Rothschild, Novit. Zool. vol. xvi. p. 36. no. 53, pl. v. fig. 28 (1909) (Aroewarwar Creek).

Mr. Moss obtained 1 ♂ of this species, of which hitherto only the unique ♀ type had been recorded.

♂. Differs from ♀ in being smaller, in the dark area of hind wings being smoky-black sharply cut off from the cream-coloured costal area, and in the hind wings being small and triangular.

Length of fore wing, ♂ 17 mm., ♀ 20 mm.; expanse, ♂ 41 mm., ♀ 47 mm.

1 ♂ caught.

## 13. *Aphyle margaritacea*, Walk.

*Aphyle margaritacea*, Walker, List Lepid. Ins. Brit. Mus. pt. iii. p. 720, no. 1 (1885) (Pará).

1 ♂, 2 ♀♀ caught.

## 14. *Phaëmolis incarnata* (Hmps.).

*Aphyle incarnata*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii. p. 20, no. 1215, fig. 11 (1901) (St. Paulo di Olivenças).

1 ♂, 1 ♀ caught; 1 ♀ bred (cocoon hammock-shaped, with long narrow pointed ends yellowish wood-brown).

There appears to be considerable confusion with this insect and its near allies; Sir George Hampson, when describing it, only knew the ♀; the ♂ was described five years later by Mr. Herbert Druce as *Idalus marpessa*



(Ann. & Mag. Nat. Hist. (7) xvii. p. 497 (1906) (Carabaya), and placed by Sir George in the genus *Eupseudosoma*. In 1909 I described an allied insect as *Prumala incisa* (Nov. Zool. vol. xvi. p. 25, pl. iv. fig. 17 (1909) (Fonte Boa)) from a ♀, and this insect Sir George placed next to his *incarnata* in *Aphyle*; in 1911 Monsieur Dognin described a ♂ distinct from Druce's *marpessa* under the name of *Eupseudosoma parapessa* (Hét. Nouv. Amer. Sud, fasc. v. p. 9 (1912) (Fonte Boa)), which is evidently the ♂ of my *incisa*. Lastly, in 1909 I described as *Antaxia affinis* (Nov. Zool. vol. xvi. p. 26, pl. iv. fig. 20 (1909) (Carabaya)) a further allied form which Sir George placed next to *parapessa*, Dogn., in *Eupseudosoma*. Dr. Jordan has examined all these with the exception of the ♂ *parapessa*, and finds the neuration is the same.

Dr. Jordan also examined a number of species placed in the genera *Phæomolis*, *Neaxia*, *Eriostepta*, *Anaxia*, *Evius*, and *Areomolis*, and is convinced that all the species with modified or distorted hind wings due to the presence of scent-organs belong to one genus, while those with normal hind wings belong to another. The presence of the very varied types of scent-organ displaces the veins of the hind wings, and the resulting neuration cannot be considered generic, as it is confined to the ♂ sex.

It becomes apparent, therefore, that the whole of the Arctiinæ requires a complete classificatory revision, and the present paper must be read in that light; the alteration of generic names can only be considered as tentative.

### 15. *Phæomolis bella bella* (Schaus).

*Neaxia bella*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 212 (1906) (St. Jean de Maroni).

Sir George Hampson places this directly after *Neaxia theon*, Druce, whereas the neuration agrees with that of *Phæomolis lepida*, Schaus. I believe, in fact, that *lepida*, Schaus, is only the Central-American race of *bellu*, Schaus, and must stand as *Phæomolis bella lepida* (Schaus).

5 ♂ ♂, 1 ♀ caught.

### 16. *Prumala saturata* (Walk.).

*Automolis saturata*, Walker, List Lepid. Ins. Brit. Mus. pt. vii. p. 1635 (1856) (Pará).

7 ♂ ♂ caught.

17. *Prumala similis*, Rothschild.

*Prumala similis*, Rothschild, Novit. Zool. vol. xvi. p. 268 (1909)  
(Fonte Boa)

6 ♂♂, 6 ♀♀ caught.

18. *Prumala intermedia*, sp. n.

Similar to *optima*, Butl., and *hieroglyphica*, Schaus, but with the discal pattern of fore wings much obliterated and more saturated with rose-colour. Hind wings semihyaline bright rose. Size of *optima*.

2 ♂♂ caught.

19. *Premolis semirufa* (Walk.).

*Halisidota semirufa*, Walker, List Lepid. Ins. Brit. Mus. pt. vii. p. 1708 (1856) (Pará).

9 ♂♂, 4 ♀♀ bred; 2 ♀♀ caught (cocoon rough hammock-shaped, greyish brown).

20. *Azatrepes discalis* (Walk.).

*Halisidota discalis*, Walker, List Lepid. Ins. Brit. Mus. pt. vii. p. 1706 (1856) (Amazon Valley).

*Zatrephes paradisea*, Butler, Ill. Lepid. Het. Brit. Mus. pt. i. p. 52, pl. xvii. fig. 11 (1877) (Rio Yutaki).

In 'Novitates Zoologicæ,' xvi. p. 33, I unfortunately identified Walker's *Halisidota discalis* with the insect afterwards described by Sir George Hampson as *Azatrepes argyrotis*, quite failing to understand that in reality Butler's *paradisea* was identical with Walker's *discalis*, and therefore must fall as a synonym.

8 ♂♂, 1 ♀ caught.

21. *Azatrepes argyrotis orientalis*, subsp. n.

♂. Differs from *argyrotis argyrotis*, Hampson, in the heavier brown markings of the fore wings, the more distinct yellow lower half of abdomen, and the distinct orange-yellow wedge in the hind wings.

♀. Differs in more yellowish-brown markings, not rufous-brown.

4 ♂♂, 7 ♀♀ caught.

22. *Zatrephes modesta*, Schaus.

*Zatrephes modesta*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 210 (1906) (St. Jean de Maroni).

1 ♂ caught.

23. *Zatrephes flavida*, Hampsn.

*Zatrephes flavida*, Hampson, Ann. & Mag. Nat. Hist. (7) xv. p. 441 (1905) (St. Jean de Maroni).

Sir George Hampson unites my *albotestacea* with his *flavida*, but I do not agree.

1 ♂ caught.

24. *Zatrephes trilineata*, Hampsn.

*Zatrephes trilineata*, Hampson, Ann. & Mag. Nat. Hist. (7) xv. p. 441 (1905) (St. Jean de Maroni).

2 ♂ ♂ caught.

25. *Zatrephes bilineata rufobrunnea*, Rothsch.

*Zatrephes bilineata rufobrunnea*, Rothschild, Novit. Zool. vol. xvi. p. 31, pl. iv. fig. 40 (1909) (Fonte Boa).

Sir George Hampson has treated my *rufobrunnea* as a mere aberration, which is quite wrong, as it is the Amazonian local race, whereas typical *bilineata* only occurs in Southern Peru.

1 ♂ caught.

26. *Zatrephes foliacea*, Rothsch.

*Zatrephes foliacea*, Rothschild, Novit. Zool. vol. xvi. p. 31, pl. iv. figs. 41-43 (1909) (Fonte Boa).

27. *Zatrephes flavinotata* (Rothsch.).

*Automolis flavinotata*, Rothschild, Novit. Zool. vol. xvi. p. 39, pl. vi. fig. 4 (1909) (San Antonio do Javary).

Sir George Hampson has placed this insect and my *Automolis pseudopræmolis* in *Zatrephes*, which appears to me quite wrong, but until the whole subfamily can be revised I leave them in that genus rather than risk a double change.

The undescribed ♂ differs from the ♀ in its narrower and more pointed fore wings, and in the less extent of rose on the hind wing.

The Pará series is very small. Expanse: type ♀, 36 mm.; Pará, ♂ ♂ 26-30 mm., ♀ 30 mm.

5 ♂ ♂, 1 ♀ caught.

28. *Zatrephes nitida* (Stoll).

*Phalæna nitida*, Stoll in Cramer, Pap. Exot. vol. iii. pt. xxiii. p. 147, pl. cclxxiv. fig. F (1780) (Surinam).

Sir George Hampson has united my *rosella* with *nitida*, but this is not the case, the two being quite distinct.

The three examples sent by Mr. Moss are particularly bright, and have the hind wings deep rose-colour.

3 ♂ ♂ caught.

29. *Zatrephes rufescens*, Rothsch.

*Zatrephes rufescens*, Rothschild, Novit. Zool. vol. xvi. p. 29 (1909)  
(Fonte Boa).

2 ♂ ♂ caught.

30. *Zatrephes rosacea*, Rothsch.

1 ♂ caught.

31. *Zatrephes traili*, Butl.

*Zatrephes traili*, Butler, Illust. Lepid. Het. Brit. Mus. pt. i. p. 52,  
pl. xvii. fig. 7 (1877) (River Jurua).

1 ♀ caught.

32. *Eupseudosoma bifasciata* (Cram.).

*Phalæna bifasciata*, Cramer, Pap. Exot. vol. iii. pt. xxi. p. 104,  
pl. cclii. fig. F (1779) (Surinam).

2 ♂ ♂, 1 ♀ caught.

33. *Eupseudosoma involuta* (Sepp).

*Phalæna involuta*, Sepp, Surin. Vlind. vol. i. pl. cxv. (1852) (Surinam).

8 ♂ ♂, 4 ♀ ♀ caught.

34. *Eupseudosoma mossi*, sp. n.

♀. Pectus white; head and antennæ very pale grey; thorax white; abdomen whitish grey, anal segment white with darker grey spot. Fore wing satiny white, a blackish-grey dot between veins 3 and 4 at their base, and a similar subterminal one between 5 and 6. Hind wings satiny-white.

Length of fore wing 18 mm.; expanse 42 mm.

1 ♂ caught.

35. *Eriostepta fulvescens*, Rothsch.

*Eriostepta fulvescens*, Rothschild, Novit. Zool. vol. xvi. p. 27, pl. iv.  
fig. 28 (1909) (Fonte Boa).

1 ♂ caught.

36. *Amaxia pseudodyuna*, sp. n.

♂. Allied to *dyuna*, Schaus, from Sao Paulo, but distinguished at once by the reduced yellow and increased scarlet marking in basal area of fore wing, and in the intense rose-coloured opaque hind wings with vein 5 absent.

Length of fore wing 15 mm.; expanse 34 mm.

6 ♂♂ caught.

37. *Amaxia flavicollis* (Rothsch.).

*Prumala flavicollis*, Rothschild, Novit. Zool. vol. xvi. p. 25, pl. iv. fig. 15 (1909) (Fonte Boa).

The type and unique ♂ hitherto recorded is much broken, so it is very gratifying to find two fine examples among Mr. Moss's captures, especially as now correct dimensions can be given.

Length of fore wing 17 mm.; expanse 40 mm.

2 ♂♂ caught.

38. *Amaxia perapyga*, sp. n.

♂. Differs from *apyga* above in the absence of red in the basal brown area of fore wing, in the yellow dot in same area, in the larger lobe to costa of hind wing and the much larger and practically colourless androconial patch, and in the smaller size, and in the anal segment of abdomen being almost entirely yellow. Below it differs on fore wing in the much larger androconial patch and in the absence of the broad black band beyond it, only a small patch of black scales at upper and lower edges of outer side of androconial patch being present.

Length of fore wing: *apyga*, 19 mm., expanse 43 mm.; *perapyga*, 16 mm., expanse 36 mm.

1 ♂ caught.

[*Amaxia perapyga semivitreata*, subsp. n.

♂. Differs from *p. perapyga* in the hind wing being semi-vitreous greyish white in costal half and only opaque and blackish on lower half.

3 ♂♂, 1 ♀, Fonte Boa, Upper Amazons, May-Aug. 1906 (*G. M. Klages coll.*).]

39. *Amaxia chaon* (Druce).

*Zatrephes chaon*, Druce, Proc. Zool. Soc. Lond. 1883, p. 383, pl. xl. fig. 10 (Sarayacu, Ecuador).

This insect varies amazingly in size, the smallest in the

Tring Museum being from St. Jean de Maroni and the largest from Costa Rica.

Expanse, ♂, smallest 26 mm., largest 46 mm.; ♀, smallest 32 mm., largest 58 mm.

5 ♂ ♂, 2 ♀ ♀ caught.

#### 40. *Evius albiscripta*, Schaus.

*Evius albiscripta*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 213 (1906) (St. Jean de Maroni).

Sir George places this insect in the same genus as *aurococcinea*, Walk., and *cochenouri*, Schaus, but I think it fits much better into *Eriostepta*.

1 ♂ caught.

#### 41. *Evius aurococcinea*, Walk.

*Evius aurococcinea*, Walker, List Lepid. Ins. Brit. Mus. pt. iii. p. 640. no. 1 (1855) (Pará).

11 ♂ ♂ caught.

#### 42. *Aræomolis rhodographa*, Hmps. n.

*Aræomolis rhodographa*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii. p. 38. no. 1245 (1901) (Thomar, Rio Negro).

1 ♂ caught.

#### 43. *Aræomolis sanguinea*, Hmps. n.

*Aræomolis sanguinea*, Hampson, Ann. & Mag. Nat. Hist. (7) xv. p. 442 (1905) (St. Jean de Maroni).

This insect appears to me so totally unlike the genotype that I cannot believe it is really an *Aræomolis*.

2 ♂ ♂ caught.

#### 44. *Paranerita suffusa*, Rothschild.

*Paranerita suffusa*, Rothschild, Novit. Zool. vol. xvi. p. 298 (1909) (Tumatumari).

3 ♂ ♂, 1 ♀ caught.

#### 45. *Paranerita metapyria*, Dognin.

*Paranerita metapyria*, Dognin, Ann. Soc. Entom. Belg. li. p. 229 (1907) (St. Laurent de Maroni).

2 ♂ ♂ caught.

46. *Paranerita carminata*, Schaus.

*Paranerita carminata*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 227 (1907) (St. Jean de Maroni).

2 ♂♂ caught. (This species has hitherto only been known from the unique type.)

47. *Paranerita coccineothorax*, sp. n.

♂. Nearly allied to *persimilis*, Rothsch. Differs in the narrower and more pointed fore and hind wing, in the less extent of the brownish-mauve basal area of fore wing, in the smaller subapical patch, and in the brilliant scarlet pro- and metathorax. The subapical patch does not extend beyond subcostal nervure, and above it is a bright scarlet stripe; abdomen and markings in basal area of fore wing scarlet; hind wings scarlet-crimson.

1 ♂ caught.

48. *Paranerita polyxenoides*, Rothsch.

*Paranerita polyxenoides*, Rothschild, Novit. Zool. vol. xvi. p. 297 (1909) (Fonte Boa).

1 ♂ caught.

49. *Paranerita cuneoplagiatus*, sp. n.

♂. Allied to *triangularis*, Rothsch., but with narrower and more pointed wings. Pectus pinkish cream-colour; antennæ, basal two-thirds dull pink, outer third cream-buff; head, frons yellow with red band, vertex red, yellow in front; thorax rosy red slightly powdered with yellow; abdomen with white dot at base, rosy red marked with yellow.

Fore wing reddish mauve-brown strongly washed with rose; apex yellow, a large wedge-shaped patch of yellow runs in from costa to median nervure, and a similar one from termen, both edged with scarlet, a yellow dot broadly surrounded by scarlet above vein 1 near base.

Hind wings rose-pink.

Length of fore wing 12 mm.; expanse 28 mm.

[*Paranerita oroyana*, sp. n.]

♂. Very closely allied to *cuneoplagiatus*. Pectus yellowish buff; antennal shaft red, pectinations buffish yellow; head yellow slightly powdered with red; thorax pale mauve

wood-brown powdered with red and yellow; abdomen scarlet-winged and slightly powdered with yellow.

Fore wing mauve wood-brown irrorated with yellow; a small yellow patch at apex edged with scarlet, termen narrowly yellow, a very large curved wedge-shaped yellow patch runs in from costa to median vein, and between this and base of wing is a smaller yellow spot, both edged with scarlet, a wedge-shaped yellow patch edged with scarlet runs in from termen, a yellow dot edged with scarlet above and a scarlet streak below vein 1 near base. Hind wing buffish yellow suffused and towards outer third somewhat rayed with red.

Length of fore wing 16 mm.; expanse 35 mm.

5 ♂♂, La Oroya, Rio Inambari, Peru, 3100 ft., dry season, Sept. 1904 (*G. Ockenden coll.*.)]

#### 50. *Hyponerita similis*, Rothsch.

*Hyponerita similis*, Rothschild, Nov. Zool. vol. xvi. p. 299 (1909) (Fonte Boa).

1 ♂ caught.

#### 51. *Hyponerita viola*, Dogn.

*Hyponerita viola*, Dognin, Ann. Soc. Entom. Belg. vol. liii. p. 220 (1909) (St. Laurent de Maroni).

1 ♀ caught. (1 ♀, Rio Madeira, *Moss.*)

#### 52. *Hyponerita incerta*, Schaus.

*Hyponerita incerta*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 229 (1905) (St. Jean de Maroni).

1 ♂ caught.

#### 53. *Hyponerita furva*, Schaus.

*Hyponerita furva*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 228 (1905) (Geldersland, Surinam River).

1 ♂ caught.

#### 54. *Neritos onytes* (Cram.).

*Phalæna onytes*, Cramer, Pap. Exot. vol. ii. pt. xiv. p. 107, pl. clxv. fig. E (1777) (Surinam).

Sir George Hampson considers that *onytes*, Cram., and *psamas*, Cram., are ♀ and ♂ of the same insect, and that



the ♂ ♂ with the discal band complete and those with it broken into two spots are only aberrations. I for the present consider they are two species for the following reasons: the ♂ ♂ with the band complete have the pectinations of the antennæ longer and they do not start diminishing in length so soon, they have the hind wings right up to the lobe opaque dark sooty-grey, and they are less strongly tinged with pink. The ♂ ♂ with broken bands, on the other hand, have shorter branches to the antennæ, diminishing in length from nearer the base, have the basal half to two-thirds of hind wing more semivitreous and tinged with whitish grey, and they are very strongly tinted with rose. The ♀ ♀ differ only in the more opaque and darker hind wings and lighter less opaque ones respectively.

2 ♂ ♂, 1 ♀ caught.

55. *Neritos psamas* (Cram.).

*Phalæna psamas*, Cramer, Pap. Exot. vol. iii. pt. xx. p. 72, pl. ccxxxiv. fig. G (1779) (Surinam).

2 ♂ ♂, 1 ♀ caught.

56. *Neritos sorex*, Druce.

*Neritos sorex*, Druce, Ann. & Mag. Nat. Hist. (7) ix. p. 323 (1902) (San Emioto, Mapiri, Bolivia).

1 ♂ caught.

57. *Neritos sardinapalus* (Rothsch.).

*Hyponerita sardinapalus*, Rothschild, Novit. Zool. vol. xvi. p. 51, pl. vii. fig. 21 (1909) (La Unión, Rio Huacamayó).

1 ♂, 1 ♀ caught.

58. *Neritos steniptera*, Hampson.

*Neritos steniptera*, Hampson, Ann. & Mag. Nat. Hist. (7) xv. p. 445 (1905) (St. Jean de Maroni).

3 ♂ ♂ caught. (Sir George Hampson has united my *basalis* with his *steniptera*, but it is distinct.)

59. *Neritos ockendeni coccinea*, subsp. n.

♂. Differs from *o. ockendeni* in the absence of the white markings of the fore wings, the scarlet borders being entirely filled in with scarlet on the type, and only an indication of a light mark on the termen of the second specimen.

On the hind wing the present form differs in the black outer border being much wider, occupying more than half the wing.

2 ♂♂ caught.

[*Neritos ockendeni parvimacula*, subsp. n.

♂ ♀. Differ from *o. ockendeni* in the markings on the fore wings being much reduced in size and in the much wider outer black margin to the hind wings, which occupies more than half the wing.

15 ♂♂, 6 ♀♀, St. Jean de Maroni, Cayenne.

(The Tring Museum has a ♀ from Aroewarwar Creek, Surinam, which has the dark outer portion of the hind wing occupying fully two-thirds of the wing and is probably a fourth subspecies.)]

60. *Neritos cyclopera*, Hmps. n.

*Neritos cyclopera*, Hampson, Ann. & Mag. Nat. Hist. (7) xv. p. 446 (1905) (St. Jean de Maroni).

10 ♂♂, 1 ♀ caught.

61. *Neritos lavendulae*, Rothschild.

*Neritos lavendulae*, Rothschild, Novit. Zool. vol. xvi. p. 204 (1909) (Aroewarwar Creek).

1 ♂ caught. (Sir George Hampson has united this with *sithnides*, Druce, but the ♂ neuration is quite different.)

62. *Parevia methæmia*, Schaus.

*Parevia methæmia*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 213 (1905) (St. Laurent de Maroni).

1 ♂ caught.

[*Schalotomis postsuffusa*, sp. n.

♂. Pectus buff; antennæ, basal three-fifths scarlet, rest sooty-grey; head, frons brownish mauve edged with scarlet, vertex yellow; thorax mauve strongly washed with vermilion; abdomen scarlet, basal spot white, anal tuft yellow.

Fore wing, basal half obliquely pinkish mauve narrowly edged with scarlet, outer half yellow, a large rounded apical patch pinkish mauve margined very narrowly with scarlet.

Hind wing triangular, much produced at tornus; costal

two-thirds yellowish salmon-colour, inner third yellow, clothed thickly with long hair.

Length of fore wing 12 mm.; expanse 27 mm.

1 ♂, Potaro, British Guiana, May 1908 (*S. M. Klages coll.*).]

63. *Schalotomis postsuffusa pallida*, subsp. n.

♂. Differs from above in paler coloration and smaller size; the mauve is more greyish and the hind wing is yellowish white tinged with rose near apex. Abdomen buff marked with red.

Length of fore wing 10 mm.; expanse 23 mm.

1 ♂ caught. (Sir George Hampson has placed my *curta*, together with an insect I described as a Lithosid, as *Diurhabdosia roseothorax* in a new genus *Schalotomis*, but I feel certain this cannot be correct.)

64. *Antaxia hyalina* (Rothsch.).

*Automolis hyalina*, Rothschild, Novit. Zool. vol. xvi. p. 41, pl. v. fig. 33 (1909) (La Oroya).

1 ♂ caught.

65. *Automolis crithéis* (Druce).

*Idalus crithéis*, Druce, Biol. Centr.-Amer. Het. i. p. 89, pl. ix. fig. 19 (1884) (Panama).

5 ♂ ♂ caught; 1 ♂, 1 ♀ bred.

66. *Automolis aleteria*, Schaus.

*Automolis aleteria*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 214 (1905) (St. Jean de Maroni).

6 ♂ ♂ caught (1 labelled U. Amazon also in Moss coll.).

67. *Automolis larissa* (Druce).

*Idalus larissa*, Druce, Proc. Zool. Soc. Lond. 1890, p. 496, pl. xlii. fig. 5 (Santarem, Amazons).

4 ♂ ♂ caught (1 labelled "R. Madcira" also in Moss coll.).

68. *Automolis reducta* (Walk.).

*Automolis reducta*, Walker, List Lepid. Ins. Brit. Mus. pt. vii. p. 1638 (1856) (Amazon Valley).

2 ♂ ♂, 1 ♀ caught.

69. *Automolis albescens* (Rothsch.).

*Eupsodosoma albescens*, Rothschild, Novit. Zool. vol. xvi. p. 26, pl. iv.  
fig. 25 (1909) (Aroewarwar Creek).

70. *Automolis semiopalina* (Feld.).

*Ischnognatha semiopalina*, Felder, Reis. Nov. pl. cii. fig. 2 (1874)  
(Cayenne).

8 ♂♂, 1 ♀ caught.

71. *Automolis flavescens* (Walk.).

*Halisidota flavescens*, Walker, List Lepid. Ins. Brit. Mus. pt. vii.  
p. 1750 (1856) (Pará).

1 ♀ caught.

72. *Automolis lurida* (Feld.).

*Eucyrta lurida*, Felder, Reis. Nov. pl. cii. fig. 7 (1874) (Nari, Upper  
Amazons).

5 ♂♂ caught.

73. *Automolis sanguinolenta* (Cram.).

*Phalæna sanguinolenta*, Cramer, Pap. Exot. vol. iii. pt. xx. p. 102,  
pl. cclii. fig. A (1779) (Surinam).

5 ♂♂ caught.

74. *Automolis cruenta*, Rothschild.

*Automolis cruenta*, Rothschild, Novit. Zool. vol. xvi. p. 38, pl. v.  
fig. 39 (1909) (La Oroya).

2 ♂♂ caught.

75. *Automolis ventralis* (Schaus.).

*Machierapterus ventralis*, Schaus, Proc. Zool. Soc. Lond. 1894, p. 229  
(Aroa, Venezuela).

13 ♂♂ caught.

76. *Automolis leucoptera*, Hmps. n.

*Automolis allescens*, Rothschild, Novit. Zool. vol. xvi. p. 36, pl. v.  
fig. 26 (1909) (British Guiana) (nom. preec.).

The undescribed ♂ differs in being smaller, having the

fore wings more pointed, and the hind wings more triangular in shape.

Length of fore wing, ♂ 31 mm., ♀ 43 mm.; expanse, ♂ 69 mm., ♀ 95 mm.

6 ♂ ♂, 2 ♀ ♀ caught.

77. *Automolis pandiona* (Stoll).

*Phalæna pandiona*, Stoll in Cramer, Pap. Exot. vol. iv. pt. xxxiv. p. 228, pl. cccxcvii. fig. I (1782) (Surinam).

2 ♂ ♂, 1 ♀ bred (cocoon hammock-shaped, greyish white).

78. *Automolis milesi*, sp. n.

♀. Pectus yellow; antennæ creamy grey; frons cinnamon-brown; vertex and basal half of patagia yellow; rest of thorax mauve-cinnamon; abdomen pale cinnamon strongly washed with rose.

Fore wing cinnamon mauve-brown; a number of indistinct golden-yellow spots in basal third, a semihyaline cream-buff patch above each of veins 3, 4, and 5, a row of quadrate yellow patches on termen between veins 2 and 7, and a yellow dot below vein 2.

Hind wing, basal half and inner area dirty white, outer half sooty pale mauve-brown, a row of three yellow spots on termen near apex and fringe yellowish.

Length of fore wing 20 mm.; expanse 44 mm.

2 ♀ ♀ bred.

79. *Automolis apicalis* (Walk.).

*Euchromia apicalis*, Walker, List Lepid. Ins. Brit. Mus. pt. i. p. 261 (1854) (Pará).

1 ♂ caught.

80. *Automolis opposita* (Walk.).

*Euchromia opposita*, Walker, List Lepid. Ins. Brit. Mus. pt. i. p. 260 (1854) (Brazil).

2 ♂ ♂ caught.

81. *Automolis sphingidia* (Perty).

*Glaucopis sphingidea*, Perty, Delect. Anim. Art. p. 158, pl. xxi. fig. 12 (1834) (Rio Negro).

6 ♂ ♂ caught.

82. *Automolis flammans*, Hampsn.

*Automolis flammans*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii. p. 50, pl. xxxvi. fig. 9 (1901) (Columbia).

3 ♂ ♂ caught; 1 ♂, 4 ♀ ♀ bred. (Cocoon large, netted round web of coarse brown threads slightly intermixed with hair. Pupa uniform sausage-shaped, rounded at both ends, black, very glossy, interspaces of abdominal segments rufous-chestnut; cremaster consists of a bunch of short, stiff, dark brown bristles.)

83. *Automolis strigosa* (Walk.).

*Euchromia strigosa*, Walker, List Lepid. Ins. Brit. Mus. pt. i. p. 273 (1854) (Rio Janeiro).

1 ♂ ♂ caught.

84. *Automolis niveomaculata*, Rothsch.

*Automolis niveomaculata*, Rothschild, Novit. Zool. vol. xvi. p. 42, pl. vi. fig. 21 (1909) (La Union).

2 ♂ ♂ caught.

85. *Automolis alboatra*, Rothsch.

*Automolis alboatra*, Rothschild, Novit. Zool. vol. xvi. p. 46, pl. vi. fig. 30 (1909) (Fonte Boa).

3 ♂ ♂ caught.

[*Automolis fuliginosa*, Rothsch.]

*Automolis fuliginosa*, Rothschild, Novit. Zool. vol. xvii. p. 187, pl. xiv. fig. 10 (1910) (Fonte Boa).

Some time after I described the above species from a single ♀, I found while arranging my Amatidae 3 ♂ ♂ Arctiids from La Union, which were evidently a species of *Automolis*, and agreed so well with what one would suppose the ♂ *fuliginosa* to be like that I put them under that species. In Mr. Moss's collection, however, there is a specimen labelled "Alt. Am." (=Upper Amazonas) which is the undoubted ♂ of *fuliginosa*, for it is exactly like the ♀ type in coloration, and only differs in the fore wings being more pointed and narrower and the hind wings shorter and more triangular. Therefore the La Union insect requires a name.

*Automolis approximans*, sp. n.

♂. Differs from the ♂ of *fuliginosa* in its metallic-blue pectus and vertex, in the absence of the white dots on the patagia and the white basal patches of the tegulæ, in the metallic-blue not white patch at apex of mesothorax, and in the broader, shorter, and more rounded fore wings.

Length of fore wing 15 mm.; expanse 34 mm.

3 ♂♂, La Union, Rio Huacamayo, Carabaya, 2000 ft., wet season, Nov. 1904 (*G. Ockenden coll.*).]

86. *Automolis separata* (Walk.).

*Apyre separata*, Walker, List Lepid. Ins. Brit. Mus. pt. ii. p. 491 (1854) (Ega, Amazons).

12 ♂♂ caught.

87. *Automolis contraria*, Walk.

*Automolis contraria*, Walker, List Lepid. Ins. Brit. Mus. pt. i. p. 259 (1904) (Ega).

2 ♂♂ caught.

88. *Automolis superba*, Druce.

*Automolis superba*, Druce, Proc. Zool. Soc. Lond. 1883, p. 382, pl. xl. fig. 8 (♀) (Sarayacu, Ecuador).

1 ♂ caught.

89. *Automolis elissa*, Schaus.

*Automolis elissa*, Schaus, Proc. Zool. Soc. Lond. 1892, p. 277 (Rio Janeiro).

90. *Automolis crocopera*, Schaus.

*Automolis crocopera*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 218 (1905) (Omai, British Guiana).

The ♀ has broader fore wings and the termen of the hind wings much less concave (excised).

2 ♂♂, 2 ♀♀ caught. (The Tring Museum has a fine ♀ from Dutch Guiana.)

91. *Automolis vitrea*, Stoll.

*Phalena vitrea*, Stoll in Cramer, Pap. Exot. vol. iii. pt. xxiii. p. 151, pl. cclxxvi. fig. C (1780) (Surinam).

7 ♂♂, 2 ♀♀ caught.

92. *Automolis vitreoides*, sp. n.

Differs from *vitrea meridionalis* by the less distinct lines in the dark basal portion of fore wing and in their dark basal colour extending to apex along the costo-subcostal area. On the hind wing the inner third is more distinctly rose-pink and sharply cut off from rest of wing.

1 ♂ caught. (1 ♂, Trinidad, in Tring Museum.)

93. *Automolis intermedia*, Rothschild.

*Automolis intermedia*, Rothschild, Novit. Zool. xvi. p. 48, pl. vi. fig. 37 (1909) (La Union).

1 ♂, 2 ♀ ♀ caught.

94. *Automolis orbona*, Schaus.

*Automolis orbona*, Schaus, Entom. Amer. vol. v. p. 90 (1889) (Vera Cruz).

3 ♂ ♂ caught.

95. *Automolis bonora*, Schaus.

*Automolis bonora*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 219 (1905) (Cayenne).

4 ♂ ♂, 1 ♀ caught.

96. *Automolis luteola*, Rothschild.

*Automolis luteola*, Rothschild, Novit. Zool. vol. xvi. p. 44, pl. vi. fig. 9 (1909) (Sapucay).

Sir George Hampson puts my *luteola* down as the ♀ of his *Idalus xanthus*; this is not correct, as I have ♂ and ♀ of *luteola* and ♂ ♀ of *xanthus*. The Pará specimens of *luteola*, as well as of *orbona* and *bonora*, are darker and more orange than specimens from more northern localities.

2 ♂ ♂, 1 ♀ caught.

97. *Automolis polystria*, Schaus.

*Automolis polystria*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 219 (1905) (St. Jean de Maroni).

2 ♂ ♂ caught.

98. *Automolis submarginalis* (Rothschild).

*Prunala submarginalis*, Rothschild, Novit. Zool. vol. xvi. p. 24, pl. iv. fig. 16 (1909) (Minas Geraes).



99. *Automolis luteoplaga*, sp. n.

♂. Differs from *persimilis*, Rothsch., in the narrower fore wings, hardly visible pale neuration, in the pure yellow patagia, and in the much yellower thorax generally.

Length of fore wing 15 mm.; expanse 35 mm.

1 ♂ caught.

100. *Automolis ilus* (Cram.).

*Phalæna ilus*, Cramer, Pap. Exot. vol. i. pt. viii. p. 145, pl. xcii. fig. E (1776) (Surinam).

2 ♂ ♂ caught.

101. *Automolis rectiradia*, Hampson.

*Automolis rectiradia*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii p. 65, pl. xxxvi. fig. 13 (1901) (San Paulo di Olivenças).

5 ♂ ♂, 2 ♀ ♀ caught.

102. *Automolis rutilus* (Stoll).

*Phalæna rutilus*, Stoll in Cramer, Pap. Exot. vol. iv. pt. xxxii. p. 183, pl. ccclxxxii. fig. B (1781) (Surinam).

2 ♂ ♂ caught. (The buff-colour on these two specimens is deeper and brighter than in any of the long series in the Tring Museum.)

103. *Automolis albofasciata*, sp. n.

♂. Closely allied to *rutilus*; differs in the black pectus bordered with orange, in the almost obsolete grey lines on thorax, in the sooty-black not brown coloration, in the oblique subapical band of fore wing being cream-white not deep buff, and in the smaller size.

Length of fore wing, *rutilus* 19 mm., *albofasciata* 16.5 mm.; expanse, *rutilus* 45 mm., *albofasciata* 41 mm.

2 ♂ ♂ caught.

104. *Automolis moma*, Schaus.

*Automolis moma*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 218 (1905) (Omai, Brit. Guiana).

17 ♂ ♂ caught.

105. *Automolis lutosa frater*, subsp. n.

Very closely allied to *soror*, Rothsch.

♀. Only differs in the abdomen above having the basal two-thirds above black not orange and in the ground-colour being darker.

♂. Differs from ♂ *inexpectata*, Rothsch., in having a clear broad band of semihyaline white beyond discocellulars of fore wing from subcostal to vein 3, and the hind wing semihyaline white broadly bordered all round with dark grey.

Length of fore wing, ♂ 22 mm., ♀ 32 mm.; expanse, ♂ 50 mm., ♀ 72 mm.

5 ♂♂, 5 ♀♀ caught; 6 ♂♂, 2 ♀♀ bred (cocoon rough, coarse, orange buff-brown, ovate hammock-shaped).

#### 106. *Castrica phalænoides* (Drury).

*Sphinx phalænoides*, Drury, Illust. Exot. Entom. vol. ii. p. 50, pl. xxviii. fig. 6 (1773) (Bay of Honduras).

1 ♂, 1 ♀ caught.

#### 107. *Castrica sordidior*, Rothsch.

*Castrica sordidior*, Rothschild, Novit. Zool. vol. xvi. p. 48, pl. vii. fig. 5 (1909) (Caparo, Trinidad).

4 ♂♂ caught, 1 ♂ bred (cocoon ill-formed, coarse, black network filled with larval hairs).

#### 108. *Melese dorothea* (Stoll).

*Phalæna dorothea*, Stoll in Cramer, Pap. Exot. vol. iv. pt. xxxiv. p. 228, pl. cccxcvii. fig. K (1782) (Surinam).

4 ♂♂, 2 ♂♂ bred; 5 ♂♂, 1 ♀ caught (cocoon ovate, equal; ends yellow, rough).

#### 109. *Melise flavipuncta*, Rothsch.

*Melese flavipuncta*, Rothschild, Novit. Zool. vol. xvi. p. 49, pl. vii. figs. 13, 14 (1909) (Caparo, Trinidad).

2 ♂♂, 1 ♀ bred; 6 ♂♂, 3 ♀♀ caught (cocoon a loose blackish-grey web; pupa very truncate, glossy red-brown).

#### 110. *Melese surdus*, Rothsch.

*Melese surdus*, Rothschild, Novit. Zool. vol. xvi. p. 273 (1909) (Tumatumari, Brit. Guiana).

2 ♀♀ bred, 2 ♂♂ caught (cocoon loose grey web, pupa truncate, black-brown, glossy).

Sir George Hampson has united this with *incerta*, Walk., but this is erroneous; *incerta* is always more suffused with rose-crimson and has a bright yellow cocoon.

111. *Melese incerta* (Walk.).

*Malabus incerta*, Walker, List Lepid. Ins. Brit. Mus. pt. iii. p. 716. no. 1 (1855) (Pará).

1 ♂, 1 ♀ bred; 2 ♂ ♂ caught (cocoon loose, ovate, bright sulphur-yellow; pupa truncate, bright reddish brown, glossy).

112. *Ammalo helops*, Cram.

*Phalæna helops*, Cramer, Pap. Exot. vol. i. pt. vi. p. 113, pl. lxxii. fig. C (1775) (Surinam).

4 ♂ ♂, 2 ♀ ♂ caught.

113. *Ammalo violitincta*, sp. n.

♂. Pectus dull brown; antennæ black-brown; head dull chocolate-brown; patagia dull chocolate-brown, rest of thorax smoky wood-brown; abdomen brownish cinnamon-orange ringed with black.

Fore wing smoky wood-brown washed with violet-mauve. Hind wing, outer half obliquely wood-brown grey, inner half greyish yellow.

Length of fore wing 31 mm.; expanse 70 mm.

1 ♂ caught.

114. *Pareuchætes aurata* (Butl.).

*Euchætes aurata*, Butler, Cist. Entom. vol. ii. p. 38 (1875) (Santarem).

2 ♂ ♂, 3 ♀ ♀ caught (Sir George Hampson has placed in *Ammalo* a heterogeneous mass of species consisting of eleven species belonging, in my opinion, to at least four if not five different genera. In addition to this, he has united *insulata*, *aurata*, and *aravaca* as one species under *insulata*, which is quite erroneous. I have for the present used the genus *Pareuchætes*, Grote, genotype *insulata*, for the three species of this group, awaiting a final revision of the Arctiinae).

115. *Pareuchætes aravaca aurantior*, subsp. n.

♂ ♀. Differs from *aravaca aravaca*, Jord., in being suffused with orange-yellow, especially along costa and margins.

4 ♂ ♂, 2 ♀ ♀ caught.

116. *Glaucostola flavida*, Schaus.

*Glaucostola flavida*, Schaus, Proc. U.S. Nat. Mus. vol. xxix. p. 221 (1905) (St. Laurent de Maroni).

2 ♂ ♂ caught.

117. *Hæmanota rubriceps*, Hmps. n.

*Hæmanota rubriceps*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii p. 87, fig. 62 (1901) (Espiritu Santo)

1 ♂ caught.

118. *Ochrodota pronapides* (Druce).

*Zatrephes pronapides*, Druce, Ann. & Mag. Nat. Hist. (6) xiii. p. 173 (1894) (Panama).

1 ♂ caught.

119. *Ochrodota brunnescens*, Rothschild.

*Ochrodota brunnescens*, Rothschild, Ann. & Mag. Nat. Hist. (8) iv. p. 207 (1909) (Aroewarwar Creek).

1 ♂ caught.

120. *Ochrodota tessellata*, Rothschild.

*Ochrodota tessellata*, Rothschild, Ann. & Mag. Nat. Hist. (8) iv. p. 206 (1909) (Fonte Boa).

2 ♂♂, 1 ♀ caught.

121. *Carathis klagesi*, Rothschild.

*Carathis klagesi*, Rothschild, Ann. & Mag. Nat. Hist. (8) iv. p. 208 (1909) (Fonte Boa).

1 ♂ caught.

122. *Syntarctia ænone* (Butl.).

*Halisidota ænone*, Butler, Trans. Entom. Soc. Lond. 1878, p. 50, pl. iii. fig. 3 (Rio Jurua, Rio Purus).

7 ♂♂, 1 ♀ caught.

123. *Syntarctia russa tenebrosa*, subsp. n.

♂. Differs from *russa russa* in the darker, more greyish wood-brown fore wings and the greyer suffusion of the hind wings.

2 ♂♂, 1 ♀ caught.

124. *Baritius eleuthera* (Stoll).

*Phalæna eleuthera*, Stoll in Cramer, Pap. Exot. vol. iv. pt. xxxi. p. 159, pl. cccxxi. fig. A (1781) (?).

1 ♂ bred (cocoon oval, rough, dark apple-green).

125. *Baritius eleutheroides*, Rothsch.

*Baritius eleutheroides*, Rothschild, Ann. & Mag. Nat. Hist. (8) iv. p. 209 (1909) (Fonte Boa).

4 ♂ ♂ caught.

126. *Baritius flavescens*, Rothsch.

*Baritius flavescens*, Rothschild, Ann. & Mag. Nat. Hist. (8) iv. p. 209 (1909) (Fonte Boa).

1 ♂ caught.

127. *Baritius affinis*, Rothsch.

*Baritius affinis*, Rothschild, Novit. Zool. vol. xvii. p. 39 (1910) (Fonte Boa).

1 ♂ caught.

[*Sychesia dryas dryas* (Cram.).

*Phalæna dryas*, Cramer, Pap. Exot. vol. i. pt. vi. p. 110, pl. lxx. fig. C (1775) (West Indies).

2 ♂ ♂ caught, 1 Rio Madeira, 1 Upper Amazons.]

128. *Elysia hermia* (Cram.).

*Phalæna hermia*, Cramer, Pap. Exot. vol. ii. pt. xvi. p. 136, pl. clxxxv. fig. F (1777) (Surinam).

1 ♂ caught (1 ♂, Rio Madeira, also in collection).

129. *Psychophasma erosa* (Herr.-Schäff.).

*Halesidota erosa*, Herrich-Schaffer. Ausseur. Schmett. fig. 550 (1858) (Mexico).

4 ♂ ♂ caught (2 ♂ ♂, Rio Madeira, also in collection).

130. *Thalesa citrina* (Sepp).

*Phalæna citrina*, Sepp, Ins. Surinam, pl. liii. (1848) (Surinam).

1 ♂, 1 ♀ bred; 7 ♂ ♂, 7 ♀ ♀ caught (1 ♂, 2 ♀ ♀, Rio Madeira, also in collection) (cocoon ovate, rough, buffish grey).

131. *Halesidota subvitreata*, sp. n.

♂ ♀. Differ from *annulosa*, Walk., in the whiter coloration, smaller and more indistinct pattern, and in the semivitreous almost translucent nature of both pairs of wings.

Length of fore wing, ♂ 16 mm., ♀ 18 mm.; expanse, ♂ 38 mm., ♀ 44 mm.

2 ♂ ♂, 1 ♀ caught (1 ♂, 1 ♀, St. Jean de Maroni, in Tring Museum).

132. *Halisidota buchwaldi*, Rothsch.

*Halisidota buchwaldi*, Rothschild, Novit. Zool. vol. xvii. p. 67 (1910) (Fonte Boa).

This insect is very close to *maroniensis*, Schaus, and Sir George Hampson has united it with that species. I think, however, they are distinct.

3 ♂ ♂, 1 ♀ caught.

[*Halisidota androlepia*, Dogn.

*Halisidota androlepia*, Dognin, Ann. Soc. Entom. Belg. vol. liii. p. 155 (1908) (Loja).

1 ♂ caught, Lower Amazons.]

133. *Halisidota sobrina*, Möschl.

*Halisidota sobrina*, Möschler, Verh. zool.-bot. Ges. Wien, vol. xxvii. p. 668, pl. ix. fig. 32 (1877) (Surinam).

1 ♂ caught, 2 ♀ ♀ bred (cocoon roundish-ovate, rough, cream-buff).

134. *Halisidota cyclozonata*, Hmps. n.

*Halisidota cyclozonata*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii. p. 162. no. 1500, pl. xl. fig. 2 (1901) (St. Paulo di Olivenças).

1 ♂ caught.

135. *Halisidota sannionis* (Rothsch.).

*Barittus sannionis*, Rothschild, Ann. & Mag. Nat. Hist. (8) iv. p. 209 (1909) (La Oroya).

3 ♂ ♂, 2 ♀ ♀ caught.

136. *Halisidota polyodonta*, Hmps. n.

*Halisidota polyodonta*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii. p. 166. no. 1510, pl. xli. fig. 2 (1901) (Parintins, Amazons).

4 ♂ ♂, 3 ♀ caught.

137. *Halisidota ochracea*, Möschl.

*Halisidota ochracea*, Möschler, Verh. zool.-bot. Ges. Wien, vol. xxxii. p. 337, pl. xviii. fig. 28 (1883) (Surinam).

1 ♀ caught.

138. *Halisidota rufo-ochracea*, sp. n.

♀. Nearest to *ochracea*, but much darker; differs at first sight by its truncated fore wing with square-cut termen; it also differs in the head, antennæ, thorax, and fore wings being orange-rufous not golden-orange as in *ochracea*.

1 ♂ bred (cocoon a coarse network, sooty-brown; pupa black, thorax and wing-coverts reddish brown).

139. *Halisidota stipulatoides*, Rothschild.

*Halisidota stipulatoides*, Rothschild, Novit. Zool. vol. xvii. p. 64 (1910) (Christianburg).

1 ♂ caught.

140. *Halisidota strigulosa*, Walk.

*Halisidota strigulosa*, Walker, List Lepid. Ins. Brit. Mus. pt. iii. p. 737 (1855) (Pará).

Sir George Hampson united under *rhomboidea*, Sepp, *strigulosa*, Walk., *citrina*, Walk., and *mandus*, H.-Sch.; he himself afterwards recognised *mandus* as distinct, but *strigulosa* also is a distinct species, and I believe *citrina* is also.

1 ♂, 1 ♀ bred (cocoon ovate, rough, sooty-black).

141. *Metaxanthia vespiformis*, Druce.

*Metaxanthia vespiformis*, Druce, Ann. & Mag. Nat. Hist. (7) iii. p. 465 (1899) (Villa Nova, Amazons).

1 ♀ caught.

142. *Agorea semivitrea*, Rothschild.

*Agorea semivitrea*, Rothschild, Novit. Zool. vol. xvi. p. 291 (1909) (no special type-locality, *nomen novum*).

3 ♀ ♀ caught.

143. *Palustra laboulbeni*, Bar.

*Palustra laboulbeni*, Bar, Ann. Soc. Entom. France, (5) iii. p. 301 pl. viii. (2), figs. 1-8 (1873).

Sir George Hampson places these American insects, together with some very different-looking African and Asiatic species, in the genus *Mænus*. I feel sure this is wrong. *Mænus* has as genotype *vacula*, Stoll, which is an African species, and I consider should be confined to the African species. *Bucæa* and *Carbisa*, with *simplex*, Walk., and *venosa*, Moore, respectively, as genotypes, must be

restricted to the Asiatic species, and *Palustra* with *laboulbeni* as its genotype must be used for the American forms with the exception of *vestalis*, which will probably require a new genus.

5 ♂♂, 7 ♀♀ bred (larva black, dorsal tufts short with a double median row of still stouter rufous-buff ones, lateral tufts black, long, and silky; cocoon ovate, hammock-shaped, sooty-black, smooth). (1 ♂, 1 ♀, Rio Madeira, also in collection.)

144. *Palustra tenuis*, Berg.

*Palustra tenuis*, Berg, Stett. entom. Zeit. vol. xxxviii. p. 259 (1877).

5 ♂♂, 4 ♀♀ bred (1 ♂, 1 ♀, Rio Madeira, in the collection).

145. *Pseudalus aurantiaca*, Rothsch.

*Pseudalus aurantiacus*, Rothschild, Novit. Zool. vol. xvi. p. 52, pl. vii. figs. 25, 26 (1909) (Aroewarwar Creek).

2 ♂♂ caught.

[*Ecpantheria mus bahiaensis*, Oberth.

*Ecpantheria bahiaensis*, Oberthür, Etud. Entom. livr. vi. p. 100, pl. xvi. fig. 5 (1881) (Bahia).

1 ♀, Pernambuco, bred (pupa deep brown shagreened, abdominal interspaces red-brown; cremaster short, consisting of two bunches of stiff bristles; larval spine entirely black with stiff bristly hairs).]

146. *Ecpantheria cunigunda* (Stoll).

*Phalæna cunigunda*, Stoll in Cramer, Pap. Exot. vol. iv. pt. xxix. p. 104, pl. cccxliv. figs. D, E (1781) (Surinam).

The species of *Ecpantheria*, with few exceptions, are very complicated and difficult to identify correctly. Sir George Hampson has sunk a large number of species created by Monsieur Oberthür in his monograph, but, in my opinion, in most cases has placed them as synonyms to wrong species. The forms of the *cunigunda-baru* group are especially puzzling, and I believe the principal difficulty arises from the rapid and often very irregular fading of the wings and body. I have come to the conclusion that the specimens from the Guianas, Northern Brazil, and the Amazons are all one form and synonymous, while the South Brazilian specimens form a local race, and the two races must stand thus:—



*Ecpantheria cunigunda cunigunda*, Stoll.

*Ecpantheria cayennensis*, Oberthur, Etud. Entom. livr. vi. p. 107, pl. xiv. figs. 1, 3 (1881) (Cayenne).

*Ecpantheria bavi*, Oberthur, Etud. Entom. livr. vi. p. 108, pl. xiv. fig. 5 (1881) (Cayenne).

*Ecpantheria dubiosa*, Oberthur, Etud. Entom. livr. vi. p. 108, pl. xiv. fig. 6 (1881) (Cayenne).

*Ecpantheria cunigunda ganglio*, Oberth.

*Ecpantheria ganglio*, Oberth, Etud. Entom. livr. vi. p. 108, pl. xiii. fig. 5 (1881) (Santa Catharina).

*Ecpantheria orbiculata*, Oberthur, Etud. Entom. livr. vi. p. 108, pl. xiv. fig. 7 (1881) (Brazil).

*Ecpantheria proxima*, Oberthur, Etud. Entom. livr. vi. p. 108, pl. xv. fig. 9 (1881) (Brazil).

Of *cunigunda cunigunda* there are in the collection 11 ♂♂, 1 ♀♀ bred (pupa glossy black, abdominal interspaces golden-yellow).

146 a. *Ecpantheria detecta*, Oberth.

*Ecpantheria detecta*, Oberthur, Etud. Entom. livr. vi. p. 109, pl. xv. fig. 8 (1881) (Pará).

Sir George Hampson places *detecta* as a synonym of *abdominalis*, together with *proxima*, *detectiva*, *annexa*, and *aramis*, Oberth. Most of these are quite distinct species, and *detecta* must also stand as such.

1 ♂ caught. (There are also in collection 1 ♂, 2 ♀♀. Upper Amazon, caught.)

147. *Calidota rema* (Dogn.)

*Pseudapistotia rema*, Dognin, Bull. Soc. Entom. France, vol. ix. p. clxxvi (1891) (Sta Catharina).

1 ♀ caught.

148. *Purius pilumnia* (Stoll).

*Phalana pilumnia*, Stoll in Gramer, Pap. Exot. vol. iv. pt. xxi p. 36, pl. cccvii. fig. D (1780) (Suinam).

2 ♂♂ caught. (There are also in the collection 2 ♂♂ from the Rio Madeira and 1 ♂ from Upper Amazons.)

149. *Paracles contraria*, Walk.

*Paracles contraria*, Walker, List Lepid. Ins. Brit. Mus. pt. iii p. 717 (1855) (Pará).

1 ♂♂, 1 ♀ caught.

150. *Utetheisa ornatrix* (Linn.).

*Phalæna ornatrix*, Linnæus, Syst. Nat. edit. x. vol. i. p. 511 (1758).

9 ♂♂, 12 ♀♀ bred; 1 ♂, 1 ♀ caught.

The following species were overlooked :—

56 a. *Neritos leucoplaga*, Hmps. n.

*Neritos leucoplaga*, Hampson, Ann. & Mag. Nat. Hist. (7) xv. p. 444 (1905) (St. Laurent de Maroni).

1 ♂, 1 ♀ caught.

143 a. *Virbia parva*, Schaus.

*Virbia parva*, Schaus, Proc. Zool. Soc. Lond. 1892, p. 215 (Peru).

2 ♂♂ caught.

143 b. *Virbia palmeri*, Druce.

*Virbia palmeri*, Druce, Ann. & Mag. Nat. Hist. (8) viii. p. 139 (1911) (San Antonio, Columbia).

2 ♂♂ caught.

143 c. *Virbia hypophæa tenuimargo*, subsp. n.

♂ ♀. Differs from *hypophæa hypophæa*, Hmps. n., in the much narrower black margins of the hind wings in both sexes.

1 ♂, 1 ♀ caught.

6 a. *Neidalia bipuncta*, sp. n.

♂. Pectus reddish orange; antennæ, head, and thorax cinnamon-orange; abdomen, basal two-thirds salmon-red, anal third orange.

Fore wing orange salmon-red, costa orange, rest of nervures golden-yellow; two black dots on discocellulars and a black streak on vein 5. Hind wings salmon-pink.

Length of fore wing 16 mm.; expanse 36 mm.

5 ♂♂ caught.

The following are in the collection from Peru and other localities :—

1. *Robinsonia mossi*, sp. n.

♂. Pectus buff; antennæ, shaft white above, pectinations

and shaft below sooty-grey; frons whitish, vertex orange; thorax white; abdomen, basal segment white, rest orange. Wings sericeous milk-white.

Length of fore wing 21-24 mm.; expanse 48-52 mm.

7 ♂ ♂ caught, Lima, Peru.

## 2. *Idalus admirabilis* (Cram.).

*Phalæna admirabilis*, Cramer, Pap. Exot. vol. ii. pt. ix. p. 11, pl. ciii. fig. G (1777) (Surinam).

1 very large ♂ caught, Chanchamayo District.

## 3. *Automolis contraria*, Walk., subsp.?

1 ♀, from the Rio Madeira, caught.

There are at least two subspecies of *contraria*; and the above specimen differs from typical ♀ ♀ in having a very small subapical white spot, and apparently narrower black margins. It also has a yellow costa up to the black apex, while typical ♀ ♀ have the costa black.

Probably, therefore, further specimens would prove the existence of a third subspecies.

## [*Automolis contraria peruviana*, subsp. n.]

♀. Differs from *contraria contraria* in the very much wider black apex to fore wings, in the much larger white subapical spots, in the yellow not black inner margin of fore wings, and in the much narrower black margins to fore and hind wings.

1 ♀, La Union, Rio Huacamayo, Carabaya, 2000 ft., Dec. 1904 (wet season) (*G. Ockenden*).]

## 4. *Automolis drucei*, sp. n.

♀. Nearest to *dissimilis*, Druce. Differs in pectus being orange not black, in the black not grey and brown palpi and legs, and in the entirely black abdomen with last segment and anal tuft buffish grey; a grey spot on each side of sixth segment.

Fore wings differ in being darker grey, the nervures rufous not whitish; the costa white not dark buff. The hind wings are darker.

Length of fore wing 32 mm.; expanse 72 mm.

1 ♀ bred (cocoon grey, somewhat loose-webbed, hammock-shaped; pupa rufous, glossy, somewhat densely clothed on sides and dorsally with rufous hair, cremaster long, dart-shaped, sharply pointed).

5. *Melesse flavipunctata*, Rothsch.

*Melesse flavipunctata*, Rothschild, Novit. Zool. vol. xvi. p. 49, pl. vii. figs. 13, 14 (1900) (Caparo, Trinidad).

1 ♂ caught, Lima, Peru.

6. *Bertholdia crocea mossi*, subsp. n.

Differs from *crocea crocea*, Schaus, from Costa Rica, by the more maroon-brown not orange rufous-brown of the non-vitreous portions of the fore wings.

1 ♂ bred, Lima, Peru (cocoon ovate, flattened, attached to surface of leaf, rough, bright sulphur-yellow).

7. *Ammalo trujillaria peruviana*, subsp. n.

Very near *violitincta*, Rothsch., in appearance (*antea*, p. 479).

♂. Pectus yellowish brown-grey; antennae brown, as strongly punctured as in *helops*, Cram.; head and thorax dark fuscous-grey; abdomen black-brown ringed with pinkish grey and clothed with long pinkish-grey hairs on basal half.

Fore wings yellowish wood-grey, densely irrorated and strigulated with dark fuscous-grey.

Hind wings pinkish cinnamon-grey, sericeous.

♀ similar, but larger and with very much shorter pectinations to the antennae.

Length of fore wing, ♂ 30 mm., ♀ 35 mm.; expanse, ♂ 66 mm., ♀ 76 mm.

5 ♂♂, 4 ♀♀ bred, Lima, Peru (cocoon pear-shaped, sooty-brown, network not dense, transparent; pupa deep brown, glossy; abdomen much smaller and rounded, truncate; cremaster consists of tiny bunch of short hairs. Parasite *Henicospilus*, var. *flaviscutellatus*, cocoon of parasite cylindrical, bluntly rounded both ends, rough, black).

8. *Ammalo helops* (Cram.).

*Phalaena helops*, Cramer, Pap. Exot. vol. i. pt. vi. p. 113, pl. lxxii. fig. C (1775) (Surinam).

1 ♂, 4 ♀♀ caught, Chanchamayo District.

9. *Pachydota nervosa* (Feld.).

*Lophocampa nervosa*, Felder, Reise Nov. Lepid. pl. ci. fig. 6 (1874) (Bogota).

1 ♀ caught, Chanchamayo District.

10. *Syntarctia ænone* (Butl.).

*Halisdota ænone*, Butler, Trans. Entom. Soc. Lond 1875, p. 50, pl. iii. fig. 3 (Rio Junua, Rio Purus).

1 ♀, unlabelled.

11. *Pelochyta brunnescens*, Rothschild.

*Pelochyta brunnescens*, Rothschild, Ann. & Mag. Nat. Hist. (N) iv. p. 226 (1909) (Sto. Domingo, Carabaya).

1 ♂ caught, Chanchamayo District.

[*Elysia bicolor* (Weym. & Maass.).

*Elysia bicolor*, Weymer & Maasser, in Stabel's Reisen in Sud Amer. p. 132, pl. v. fig. 1 (1890) (Putzulagu, Ecuador).

This species has been wrongly identified by Sir George Hampson, myself, and others: the description and figure emphasising the yellow-red costal area of fore wing should have been sufficient to prove that the two or more Peruvian insects placed under the name *bicolor* (= *walkeri* and *mossi*, infra) could not be that insect.]

12. *Elysia walkeri*, sp. n.

♂. Pectus dark brown; antennæ umber-brown; head and thorax sooty black-brown; abdomen above basal two-thirds brightly yellowish buff, long-haired, anal one-third brown.

Fore wings sooty wood-brown, very thinly scaled, nervures reddish brown.

Hind wings semihyaline milk-white, abdominal area buffish, costal and terminal fringes grey.

♀. Similar, larger; fore wings more densely scaled; abdomen, basal portion greyish buff, anal portion brownish wood-grey.

Length of fore wing, ♂ 26 mm., ♀ 30 mm.; expanse, ♂ 60 mm., ♀ 68 mm.

1 ♂, 1 ♀ caught, Lima, Peru (♂ type).

Named after Commander J. J. Walker, who took the first specimen.

13. *Elysia cellularis*, sp. n.

♂. Pectus dark mahogany-brown; antennæ, shafts black, pectinations rufous-brown; head and thorax black; abdomen sooty wood-brown.

Fore wing basal two-fifths and costal area black, outer

three-fifths sooty yellowish brown-grey, very thinly scaled, a black patch on discocellulars.

Hind wing somewhat semihyaline milk-white.

Length of fore wing 24 mm. ; expanse 54 mm.

1 ♂ caught, Lima, Peru.

14. *Elysius mossi*, sp. n.

♂. Pectus, head, and thorax sooty brown-black ; antennæ greyish brown-black ; abdomen, basal half sooty brown-grey, anal half black-brown.

Fore wing sooty dark brown, thinly scaled on disc, nervures brighter brown.

Hind wing somewhat semihyaline greyish milk-white, nervures brownish.

♀ smaller, antennæ deep black ; fore wings densely scaled sooty-black ; hind wings greyer ; basal half of abdomen greyer.

Length of fore wing, ♂ 28 mm., ♀ 24 mm. ; expanse, ♂ 62 mm., ♀ 58 mm.

1 ♂, 3 ♀ caught, Lima, Peru (2 ♂ ♂ in Tring Museum : 1 Ecuador (*Staudinger*) ; 1 Riobamba, Ecuador (*Simons*)).

15. *Opharus astur* (Cram.).

*Phalæna astur*, Cramer, Pap. Exot. vol. ii. pt. x. p. 35, pl. cxx. fig. B (1777) (Surinam).

1 ♀ caught, Chanchamayo District.

16. *Amastus rumina meridionalis*, subsp. n.

♂ ♀. Differs from *rumina rumina*, Druce, from Costa Rica, in the less rufous-brown shading of the fore wings and the broader orange markings on the patagia and tegulæ.

1 ♂, 1 ♀ caught, Chanchamayo District.

17. *Thalesa citrina albipuncta* (Rothsch.).

*Halisidota albipuncta*, Rothschild, Ann. & Mag. Nat. Hist. (5) iv. p. 221 (1909) (Ecuador).

1 ♂, 1 ♀ caught, Lima, Peru ; 1 ♀ caught, Chanchamayo District.

18. *Thalesa amaxiæformis* (Rothsch.).

*Halisidota amaxiæformis*, Rothschild, Novit. Zool. vol. xvii. p. 68 (1910) (Rio Cazapas, Ecuador).

1 ♂ caught, Santarem.

19. *Halisidota alsus* (Cram.).

*Phalæna alsus*, Cramer, Pap. Exot. vol. ii. pt. x. p. 26, pl. cxiii. fig. E (1777) (Surinam).

4 ♂♂, 3 ♀♀ caught, Lima, Peru.

20. *Halisidota sobrina*, Möschl.

*Halisidota sobrina*, Moschler, Verh. zool.-bot. Gesells. Wien, vol. xxvii. p. 668, pl. ix. fig. 32 (1877) (Surinam).

1 ♂ caught, Chanchamayo District.

21. *Halisidota schausi occidentalis*, subsp. n.

♂ ♀. Somewhat intermediate between *schausi schausi* and *schausi pallida*; the colour of the bands and spots on fore wing less brown, more greyish than in the former, but much darker than in the latter. The median band is considerably narrower than in *schausi schausi*, and narrows sharply above median to costa as in *pallida*. Hind wing greyer.

3 ♂♂, 5 ♀♀ caught, Lima, Peru.

22. *Halisidota truncata*, sp. n.

♀. Nearest allied to *ochracea*, Möschl., but at once distinguished by its square truncated termen of fore wings.

Antennæ dark brown; head and thorax and two basal segments greyish buff; rest of abdomen yellowish.

Fore wing buff powdered with greyish brown, a round black spot on discocellulars.

Hind wings semihyaline greyish buff.

Length of fore wing 15 mm.; expanse 36 mm.

1 ♀ bred, Pernambuco (cocoon greyish buff, clothed in long dense hair; pupa golden-brown, highly polished).

23. *Agorea semivitrea*, Rothsch.

*Agorea semivitrea*, Rothschild, Novit. Zool. vol. xvi. p. 291 (1909).

1 ♀ caught, Lima, Peru.

24. *Agorea mossi*, sp. n.

♂. Allied to *klagesi*, Rothsch., but paler, less grey; abdomen unspotted, except one dot at base; fore wing more suffused with yellow.

Length of fore wing 14 mm.; expanse 31 mm.

1 ♂ caught, Lima, Peru.

25. *Ecpantheria magdalenæ*, Oberth.

*Ecpantheria magdalenæ*, Oberthür, Etud. Entom. livr. vi. p. 111, pl. xviii. figs. 5, 8 (1881) (Columbia).

1 ♂ caught, Chanchamayo District.

26. *Ecpantheria peruvensis*, Hmps. n.

*Ecpantheria peruvensis*, Hampson, Cat. Lepid. Phal. Brit. Mus. vol. iii. p. 374. no. 1917, pl. li fig. 10 (1901) (Legrario, Peru).

1 ♀ caught, Chanchamayo District.

27. *Ecpantheria detecta*, Oberth.

*Ecpantheria detecta*, Oberthür, Etud. Entom. livr. vi. p. 109, pl. xv. fig. 8 (1881) (Pará).

1 ♀ caught, Chanchamayo District.

28. *Ecpantheria dubia*, sp. n.

♂ ♀. Differ from *cunigunda*, Stoll, in the pure white thorax, the transverse yellow and blue bands of abdomen, and in the closely placed bands of spots on fore wings and their obsolete pale appearance.

1 ♂, 1 ♀ caught, Lima, Peru.

29. *Ecpantheria andensis*, sp. n.

♂. Antennæ above basal three-quarters greyish white, terminal quarter black-brown; head greyish white, a dark brown tuft on vertex; thorax whitish grey, more or less densely powdered with black-brown; abdomen black-brown with lateral bands of dark yellow, basal segment with two tufts of grey.

Fore wing, basal third, costal area, and broad area above and below vein 1 dark grey, powdered, freckled, and banded with whitish grey; rest of wing hyaline, very sparsely powdered with grey scales; nervures dark grey, powdered with pale grey.

Hind wing, abdominal two-fifths brown-grey, whitish along inner edge to tornus, rest of wing hyaline, faintly and sparsely powdered with grey.

Length of fore wing 20–22 mm.; expanse 48–52 mm.

2 ♂♂ caught, "Jumin, Andes, Peru, 14,000 ft., lat. 12°."



30. *Eopantherina muzina*, Oberth.

*Eopantheria muzina*, Oberthur, Etud. Entom. livr. vi. p. 105, pl. xii. fig. 4 (1881) (Muzo, Columbia).

2 ♂♂, 7 ♀♀ caught, Lima, Peru.

Sir George Hampson has included *yukatensis*, Oberth., under this species, but I feel sure that is wrong. Of the six others of Oberthur's, which Sir George has also placed under *muzina*, I am equally convinced that several are distinct.

31. *Mallocephala imitatrix*, sp. n.

This insect in the ♂ is a curious mimic of *Mœnas? flavata*, Hampson.

♂ (normal). Antennæ, head, thorax, and abdomen deep black.

Fore and hind wings sooty-black, thinly scaled, nervures deep black.

♂ (ab. *luteola*). Sides of abdomen, costal area of fore wings, and basal half of hind wings dirty buffish yellow.

♂ (ab. *griseola*). Antennæ grey-brown; head and tegulæ buffish grey; abdomen buffish grey with narrow transverse dorsal lines.

Fore wing yellowish grey. Hind wing semihyaline isabelle-grey.

♀. Apterous, covered with sooty-black and grey or grey-down.

Length of fore wing, ♂, 11–13 mm.; expanse 26–28 mm.

17 ♂♂, 12 ♀♀ bred (1 ♂ ab. *griseola*, 7 ♀♀ ab. *luteola*), "Junin, Andes of Peru, 14,000 ft." (larva black with major portion of hairs of dorsum orange-rufous; pupa red-brown, interspaces of abdominal segments yellowish brown; cocoon ovate, hammock-shaped, thin, sooty-brown network).

The following species are out of order:—

32. *Palustra elongata*, sp. n.

♂. Head sooty black-brown; antennæ, shaft brown-grey, pectinations honey-brown; thorax wood-brown mixed with golden-brown hairs; abdomen golden-orange, a patch of sooty-brown hair on basal segment, anal segment and tuft yellowish grey.

Fore wing golden-buff somewhat freckled with black and with flammulated patches of black scales, an area, free of black scales, forming a sinuate postmedian buff band, sub-terminal area with fewer black scales; a black stigma on discocellulars.

Hind wing yellowish buff, semivitreous on disc, a broken submarginal dusky line.

♂ (ab. *sordida*). Black scaling much intensified, almost swamping entirely the ground-colour; hind wings suffused entirely with grey.

♀. Similar to ♂, but deeper golden-buff ground-colour and varying much in extent of black scaling; ♀ (ab. *sordida*) entirely dark brown, nervures blackish.

Length of fore wing, ♂ 16-17, ♀ 20-22 mm.; expanse, ♂ 40-42, ♀ 46-52 mm.

2 ♂♂, 8 ♀♀ (1 ♂, 1 ♀, ab. *sordida*) bred, "Junin, Andes of Peru, 1400 ft."

### 33. *Palustra postflavida*, sp. n.

♀. Antennæ dark brown; head and thorax brown sprinkled with yellowish hairs; abdomen above blackish brown with golden-yellow rings, basal segments with long brown hairs, anal tuft buffy-orange.

Fore wing umber-brown, very sparsely sprinkled with paler scales, two postmedian darker brown shadow bands, an arrow-shaped black discocellular stigma.

Hind wings with only one postdiscal darker band.

Length of fore wing 25 mm.; expanse 57 mm.

1 ♀ bred, "Junin, Andes of Peru, 14,000 ft." (pupa rufous-brown, broad, and truncate).

## LVII.—Notes on some Parasitic Nematodes.

By H. A. BAYLIS, M.A., D.Sc.

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### I.—ON THE GENUS *WELLCOMIA*, SAMBON, AND A NEW SPECIES OF THAT GENUS.

#### *Wellcomia samboni*, sp. n.

Host: hairy porcupine (*Coendou* [*Sphingurus*] *villosus*) \*.

Position: intestine.

Locality: Paraguay. [The animal had been in captivity in the Zoological Society's Gardens, London, for thirteen months.]

The material upon which this note is based was collected

\* More correctly *C. couiy*, Desm.

by Dr. L. W. Sambon in 1907. For the opportunity of examining it the writer is indebted to him and to the Director-in-Chief, Wellcome Bureau of Scientific Research. Thanks are also due to Mr. R. J. Ortlepp, of the Prosectorial Department of the Zoological Society, for kindly supplying some information from the records of the Society.

This interesting form is very closely related to the *Oxyuris evoluta*, v. Linst., described by Smith (1908) and by Hall (1916) from *Erethizon dorsatum* and *E. epixanthum*. v. Linstow's (1899) specimens from *Acanthion brachyura* seem to have been immature, and his description is so brief that it is difficult to be certain whether those of the later authors were of the same species. Smith's specimens were also immature. The American authors, however, have described the presence of cervical alæ, while v. Linstow mentions a spindle-shaped swelling of the cuticle anteriorly, which is probably another interpretation of the same structure.

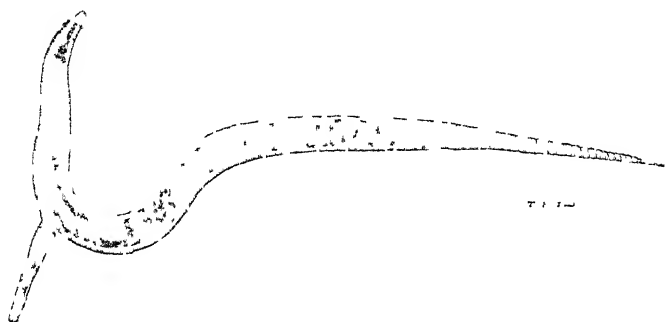
In the present material not only are the alæ apparently absent, but no cuticular swelling can be detected. Unfortunately the material consists of females only, and the specific characters depend mainly upon measurements, which can best be given in the form of a table. Most of the differences in dimensions between *W. samboni* and *Oxyuris evoluta* might be due merely to individual variation; but, besides the absence of cervical alæ, the more anterior origin of the characteristic vaginal outgrowth and its much greater length in the older females, and the somewhat larger dimensions of the eggs, appear to be valid specific characters. In the absence of a fuller description of v. Linstow's original material, therefore, we may regard the form under consideration as distinct from *O. evoluta*. It may be mentioned here that the intestinal dilatations described by Hall do not seem to be constant in magnitude and position, but vary considerably, in *W. samboni*.

Sambon (1907 *a* & *b*), under the name of *Wellcomeia mitchelli*, briefly described a form from the Cape jumping-hare (*Pedetes capensis*). Here again, unfortunately, the description had to be based on females only\*, and the measurements indicate no real difference between *W. mitchelli* and *W. samboni* (see table below). The wide differences of host and geographical distribution, however (unless, of course, the infection had been acquired in captivity), seem to justify the assumption that the species are not identical.

\* Dr. Sambon believes that a male was seen, but was unhappily lost. He thinks it had a very long slender tail, but no other details are available.

Dr. Sambon has most kindly lent me, and allowed me to reproduce, the accompanying figure (fig. 1) of *W. mitchelli*, which has not hitherto been published.

Fig. 1.



*Wellcomeia mitchelli*. Female, lateral view.  
(Drawing kindly lent by Dr. L. W. Sambon.)

The following table shows certain measurements (in millimetres) of the females of the three species referred to, the figures for *W. evoluta* being those given by Hall (1916):—

	<i>mitchelli</i> .	<i>evoluta</i> .	<i>samboni</i> .
Total length.....	12-15	9-18	8.9-13.5
Maximum thickness.....	....	Over 1.0	0.67-1.0
Diameter of head.....	....	0.1-0.19	0.08-0.1
Length of tail.....	3-4	1.72-2.58	1.9-4.0
Distance from ant. end to:			
(1) posterior end of œsophagus (excluding bulb) ..	....	0.895-1.065	0.75-0.82
(2) nerve-ring.....	....	0.095-0.155	0.13
(3) base of vaginal outgrowth.	2-3.5	1-5	1.1-2.1
Maximum diam. of œsophagus.	....	0.17-0.185	0.17-0.19
œsophageal bulb, length.....	....	0.225-0.275	0.2
" " thickness ..	....	0.29-0.345	0.25
Vaginal outgrowth, length ..	2-3	Up to 1.9	1.2-2.9
" " max thickness.....	....	0.225	0.17-0.44
Ova, measurements . . . . .	0.000-0.065	0.055-0.065	0.065-0.075
	X 0.028-0.032	X 0.025	X 0.03
Number of turns of spiral marking on tail.....	[17 in figure]	18-24	14-20

\* The measurement here given is the distance from the anus to the tip of the tail.

From the presence of a vaginal outgrowth ("conical ovipositor" of Sambon) and of a long, spirally ornamented tail in the female it seems safe to infer that all the three forms here mentioned should be placed in the same genus; and, since these features, taken together, are highly characteristic, we may retain the generic name *Wellcomeia*\*, *W. mitchelli*, Sambon, being the genotype.

Unfortunately our knowledge of the male is confined at present to *W. evoluta*, as described by Hall (1916). In that species there are in the male one pair of adanal and one pair of postanal papillæ, a single, short, imperfectly chitinated spicule, and a "flask-shaped" accessory piece. Slight alar membranes extend between the adanal and postanal papillæ of each side, and behind the postanal papillæ the tail diminishes in diameter to a slender filament.

## II.—A NEW SPECIES OF *ASCARIS* FROM AN ARMADILLO.

### *Ascaris dasypodina*, sp. n.

Host: *Cabassous unicinctus* [*Dasypus gymnurus*].

Position: small intestine.

Locality: Paraguay. [The animal had been in captivity in the Zoological Society's Gardens, London, for twenty-one days.]

For the material for this description the writer is again indebted to the Director of the Wellcome Bureau and to Dr. Sambon, by whom it was collected.

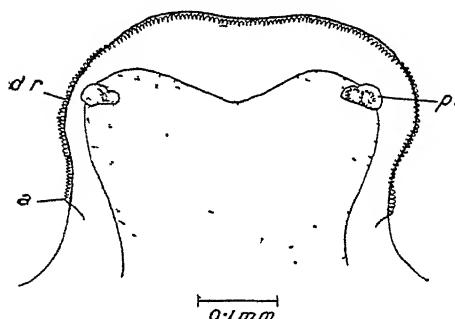
The only species of "*Ascaris*" recorded from Edentates up to the present appear to be *A. retusa*, Rud., 1819, *A. manidis*, Dies., 1851, and *A. heringii*, v. Linst., 1879. *A. retusa*, which occurs in armadillos, is, according to Schneider, a *Heterakis*. *A. manidis* and *A. heringii* (the former of which may not be an *Ascaris* at all) are comparatively small forms. The present material consists of a single male and three females of a large stout species which appears to be new.

The male measures about 110 mm. in length and 2.2 mm. in thickness; the females 113–155 mm. and 2.5–2.75 mm. respectively. The cuticular striations are coarse, about 0.025 mm. apart. The lips are large and fleshy, and simple in shape. There are no interlabia. Well-marked marginal denticulous ridges are present on the lips; they end in

\* The spelling of this name has been altered by some authors to *Wellcomea* or *Welcomia*.

salient angles posteriorly (fig. 2, *a*). The dorsal lip (fig. 2) has a transverse diameter of about 0.47 mm., and carries a pair of double papillæ at the ends of two bluntly rounded outer lobes of the pulp. In each ventro-lateral lip these two outer lobes of the pulp are unequal, the lateral lobe being considerably longer than the ventral lobe. The latter carries a large double papilla, while that of the former is small and simple. The neck is wider than the head. The œsophagus is very short (about 4 mm.), somewhat club-shaped, with a maximum thickness near the posterior end of 0.7 mm. It is muscular throughout and has no bulb or ventriculus. There are no intestinal or œsophageal cæca. The nerve-ring is situated at 1-1.15 mm. from the anterior end. The tail in

Fig. 2.

*Ascaris dasypodina*. Dorsal lip, external aspect.

*a*, posterior angle of dentigerous ridge; *d.r.*, dentigerous ridge, *p.*, papilla.

both sexes is bluntly rounded, and carries a small terminal spike.

In the male the caudal end is curled ventrally in the usual manner. The tail is extremely short (0.15 mm.). The spicules are equal and short, measuring 1.25 mm. in length. Owing to the fact that only one male is available, it has not been found possible to obtain a ventral view of the caudal end, but, as far as can be made out, there are nine pairs of postanal papillæ, of which six pairs are subventral and lie close together in the short space between the cloaca and the tail-spike; two pairs are laterally situated at about the level of the cloaca, and of these the anterior is considerably larger

than the posterior; and in addition to these there appears to be a subdorsal pair at the extremity of the tail. There are at least thirty-three pairs of preanal papillæ, arranged in a close series on either side of the ventral surface. These have rounded granular pulps, and are easily observed.

In the female the tail measures about 0.5 mm. in length. The vulva is situated at, roughly, the anterior third of the body—at 50 mm. from the anterior end in a specimen 155 mm. long, and at 30 mm. in a specimen 113 mm. long. The vagina, in the 113 mm. specimen, runs forward for about 6 mm., then bends sharply back upon itself and widens rapidly into the unpaired portion of the uterus. This runs back for a distance of about 12 mm. from the bend before giving off the two uterine branches. Each of these, just before its junction with the unpaired portion, has a slight spindle-shaped swelling. The branches of the uterus merely follow a somewhat sinuous course for the greater part of their length, but posteriorly they form one or two anteriorly-directed loops. They pass into the oviducts at about 26 mm. from the posterior end of the worm. The ovarian tubes are slender and greatly convoluted, their coils extending posteriorly almost to the extremity of the body, and anteriorly to within 22 mm. of the head-end. Their terminal portions are posterior.

The eggs are roundish-oval, with a thick shell having a granular surface-pattern and measuring  $0.07-0.875 \times 0.065-0.07$  mm. Many of them contain a fully-formed embryo, but others taken from the unpaired portion of the uterus show only segmentation-stages.

### III.—NOTE ON TWO SPECIES OF *PORROECETUM* FROM BIRDS

[*P. ensicaudatum* (Zeder, 1800) and *P. semiteres* (Zeder, 1800)].

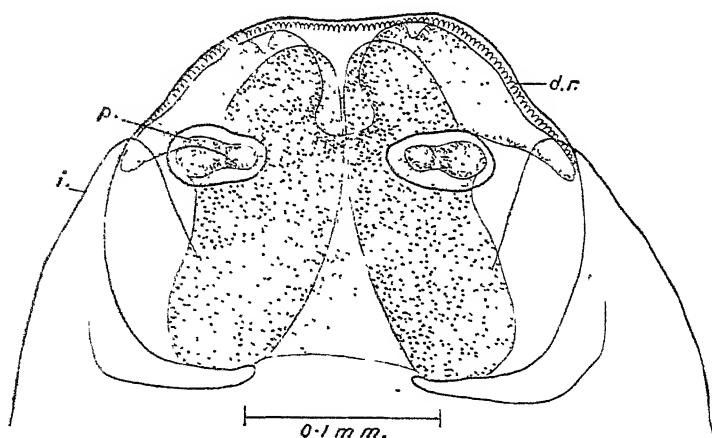
In a previous paper [Baylis (1920)] the writer gave a provisional list of species to be assigned to this genus, and indicated *P. ensicaudatum* and *P. semiteres* as distinct forms. The material available for the study of *P. semiteres* was very scanty at the time; but an opportunity having recently occurred, through the kindness of my friend Capt. R. Daubney, of examining new and well-preserved specimens from *Vanellus vanellus*, it seems desirable to give a brief note on the species. The opportunity has also been taken of comparing it with *P. ensicaudatum*, since there has been some doubt as to whether the two forms were not identical.

v. Linstow (1884) regards *Ascaris semiteres* as a synonym of *A. ensicaudata*, and gives an extensive list of hosts for this species in consequence. His figures (1884) seem to have been based on material really belonging to *P. semiteres*.

An examination of material from *Vanellus vanellus*, *Turdus merula* and *Sturnus vulgaris* shows that it includes two forms which, while possibly hardly more than subspecies, are nevertheless quite distinct and recognizable.

*P. semiteres* (Zeder, 1800), from *Vanellus*, differs from the rest of the material (*P. ensicaudatum*) in (1) the presence of

Fig. 3.



*Porrocaecum semiteres*. Dorsal lip, external aspect.

*d.r.*, dentigerous ridge; *i.*, interlabium; *p.*, papilla.

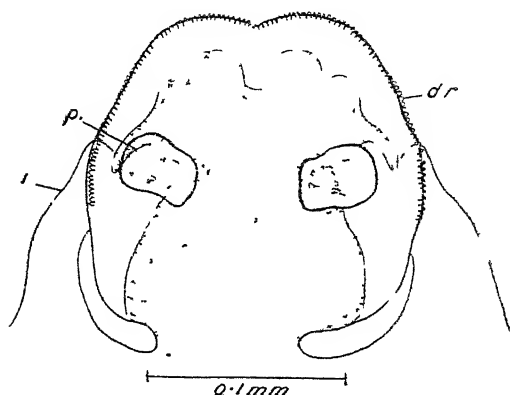
conspicuous lateral cervical alæ; (2) the much better developed condition of the intestinal cæcum (see figs. 5, 6); (3) the much greater size of the lips in mature specimens (see figs. 3, 4); and (4) the length of the spicules of the male, those of *P. semiteres* measuring 0.77–0.8 mm., while those of *P. ensicaudatum* measure only 0.62–0.63 mm.

The shape of the pulp of the dorsal lip (figs. 3, 4) is very similar in the two forms. Each of the two main anterior lobes has an indentation in its outline, and sends out an outwardly and backwardly directed “horn.” In both cases



there are deep grooves in the cuticle running from the interlabia to the base of each lip. The caudal papillæ of the male (figs. 7, 8) in every case agree in number and arrangement, and are found to be in accordance with the figure given by v. Linstow (1884). The figure given by Schneider (1866) for *Ascaris ensicaudata* is incomplete, the four small pairs of ventral postanal papillæ having been omitted. These are very minute and by no means easy to detect in some specimens. The number (eight) of pairs of postanal papillæ given by v. Linstow (1909) for "*Ascaris ensicaudata*" seems to be erroneous. In both forms the vulva divides the body nearly in the proportion of 2 : 3. There is no appreciable difference

FIG 4



*Poroecæum ensicaudatum*. Dorsal lip, external aspect.

Letting as in fig. 3.

in the arrangement of the female organs, and the eggs are of the same dimensions (about  $0.1 \times 0.075$  mm.).

No difference could be detected between the material from blackbirds and that from starlings. As has been implied already, cervical alæ are absent in *P. ensicaudatum*. This is contrary to the statements of some authors (Zeder, Rudolphi, Dujardin), who have described what was presumably the same species, and this discrepancy is difficult to explain. In order to confirm this point, transverse sections, taken close to the head, of the two species were compared, and, while in

*P. semiteres* the alæ stood out as prominent triangular structures in the sections, in *P. ensicaudatum* no such structures

Fig. 5.

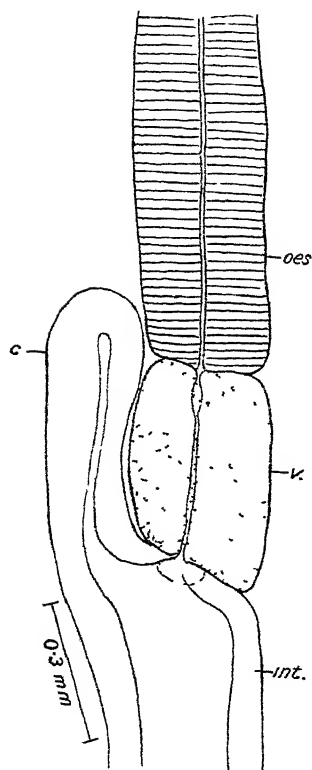


Fig 6

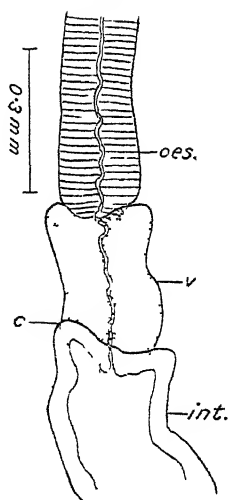


Fig. 5.—*Porrocæcum semiteres*. Posterior portion of oesophagus and anterior portion of intestine. *c.*, intestinal cæcum; *int.*, intestine; *oes.*, oesophagus; *v.*, ventriculus.

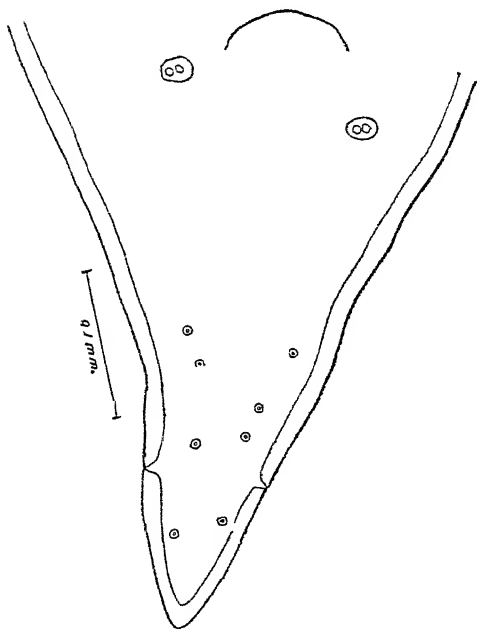
Fig. 6.—*Porrocæcum ensicaudatum*. Posterior portion of oesophagus and anterior portion of intestine. Lettering as in fig. 5 (in this case the cæcum (*c.*) is rudimentary).

could be seen. In *P. ensicaudatum* also the intestinal cæcum (fig. 6, *c.*) is usually quite rudimentary, and never appears to

equal or exceed the ventriculus in length, as it does in *P. semiteres* (fig. 5, c.).

As regards the nomenclature of these two species, that for which the name *ensicaudatum* has been used may or may not be identical with that named *Ascaris sturni* by Gmelin, 1790. The only indication of Gmelin's species is the mention of the host, but he regarded the form from the starling and

Fig. 7.



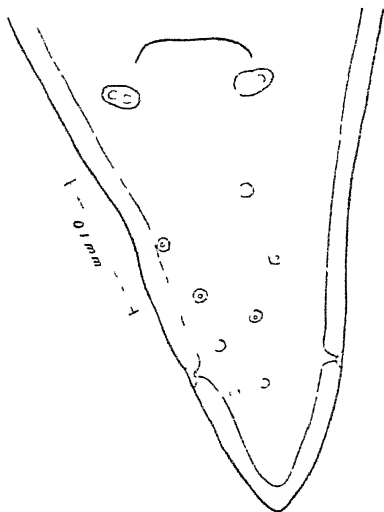
*Porrocaecum semiteres*. Tail of male; ventral view, showing postanal papillæ.

that from thrushes as distinct, giving them the names *sturni* and *turdi* respectively. If it could be definitely shown that the species *ensicaudata* and *sturni* are identical, then *sturni* would apparently have to be taken as the name of the species\*. In view of the unsatisfactory definition of

\* *Ascaris teres*, Goeze, 1782, is a collective species, and therefore inadmissible.

*A. sturni*, it seems advisable to retain the well-known name *ensicaudatum*. *P. heteroura* (Cheplin, 1829) is in all probability a synonym of *P. semiteres* (Zeder, 1800), and not a distinct species.

Fig. 8.



*Porrocaecum ensicaudatum*. Tail of male; ventral view, showing postanal papillae.

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LVIII.—New or little-known Tipulidæ (Diptera).—X *Australian Species*. By CHARLES P. ALEXANDER, Ph D, I L S, Urbana, Illinois, U S A

THE present installment, like the last considers only species from New Zealand, supplementary to those included in Mr Edwards's monographic treatment of the crane-flies of this Dominion. The material discussed herein was received from Dr Campbell, Mr Goulav, Mr Harris, Mr Howes, Mr Lindsay, Mr Philpott, Dr Tillyard, and Mr. Watt, to all of whom I would express my sincere appreciation and thanks. The holotypes of the species described herein are preserved in the writer's collection except where noted otherwise.

*Dicranomyia tarsalba*, sp. n.

Basal segment of the antenna yellow, mesonotum greyish brown, dark brownish black sublaterally, the lateral margins of the præscutum conspicuously yellow, pleura yellow with a broad, dark brown, longitudinal stripe; terminal segments of tarsi snowy white; wings dusky, stigma dark brown, anal angle of wing almost lacking.

*Male*.—Length 3.6–3.8 mm., wing 5.2–5.4 mm.

Rostrium and palpi brownish black. Antennæ with the first segment of the scape conspicuously light yellow, the remainder brownish black. Anterior part of vertex obscure yellow, the remainder of the head dark grey pruinose.

Pronotum dark, the scutellum yellow. Mesonotal præscutum greyish brown, passing into dark brownish black sublaterally, the lateral margins broadly yellowish white; scutum and scutellum greyish brown, brownish black laterally, postnotum dark brown, sparsely pruinose. Pleura yellow with a very conspicuous, black, longitudinal stripe extending from the propleura to the abdomen. Halteres elongate, dark brown. Legs with the coxæ and trochanters obscure yellow, femora pale brown, the tips dark brown; tibiæ black; metatarsi black basally, this including about two-thirds of the fore metatarsi, a little more than one-half of the posterior metatarsi, remainder of the tarsi snowy white. Wings with a dusky suffusion, more accentuated in the prearcular cells, cells *C* and *Sc*, the outer ends of cells *2nd R*<sub>1</sub> and *R*<sub>1</sub> and the base of cell *Cu*, stigma conspicuous, oval, dark brown, anal angle of the wing conspicuously whitened, a less distinct whitish area before

and beyond the stigma; veins black. Anal angle of the wing almost lacking. Venation:  $Sc_1$  ending a short distance beyond the origin of  $Rs$ ,  $Sc_2$  a corresponding distance before this origin,  $Sc_1$  alone about equal to  $r-m$ ;  $r$  a little shorter than the distal section of  $R_1$ ;  $Rs$  feebly angulated at origin, about one-half longer than the deflection of  $R_{4+5}$ ; cell 1st  $M_2$  open by the atrophy of  $m$ ; basal deflection of  $Cu_1$  immediately beyond the fork of  $M$ .

Abdominal tergites dark brown, the basal sternites paler brown; hypopygium dark.

*Hub.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, November 10, 1921 (*T. R. Harris*).

*Paratopotypes*, 2 ♂.

It is possible that the present species is more properly referable to the subgenus *Thrypticomys*, Skuse.

*Dicranomyia atrovittata*, sp. n.

Head dark grey; antennæ black, the second scapal segment conspicuously pale brown; mesonotal præscutum with three brownish-black stripes, the lateral stripes extending to the lateral margins of the sclerite; pleura dark brown; femora with a pale brown subterminal ring; wings pale yellow, the stigma nearly black; cord, outer end of cell 1st  $M_2$ , and vein  $Cu$  seamed with brown; wing-tip broadly infuscated; abdomen yellow, the lateral margins conspicuously and abruptly dark brown.

*Female*.—Length 9 mm.; wing 8.5 mm.

Described from an alcoholic specimen.

Rostrum moderately elongate, but much shorter than in *D. huttoni*, Edwards, dark brown, including the palpi. Antennæ black, the second scapal segment conspicuously paler, light brown; second scapal segment subpyriform; flagellar segments oval with short necks. Head dark grey, the anterior part of the vertex lighter grey.

Pronotum dark. Mesonotal præscutum obscure reddish yellow with three brownish-black stripes; median stripe not attaining the suture; lateral stripes crossing the suture and suffusing the cephalic half of the scutal lobes, these stripes very broad, on the præscutum extended laterad to the margin of the sclerite; median area of scutum reddish yellow, faintly and indistinctly darkened; scutellum conspicuously yellow; postnotum dark brown on caudal half. Pleura dark brown, the caudal margin of the propleura

obscure yellow; posterior pleurites obscure yellow; mesosternum dark brown. Halteres pale, the knobs brown. Legs with the coxæ yellow, the cephalic face infuscated, darkest on the fore coxæ, trochanters yellow, femora obscure yellow, with a narrow, indistinct, brown, subterminal ring; remainder of the legs pale brown, the terminal tarsal segments blackened; claws conspicuously toothed. Wings pale yellow, cells *C* and *Sc* a little brighter; stigma very conspicuous, almost black, narrow, dark brown seams at tip of *Sc*, origin of *Rs*, along the cord, outer end of cell 1st *M*<sub>2</sub> and along vein *Cu*; wing-tip very broadly and conspicuously darkened, the colour continued basad almost to the level of the outer end of cell 1st *M*<sub>2</sub>; veins brown, darker in the infuscated areas. Venation: *Sc*<sub>1</sub> ending a short distance beyond the origin of *Rs*, *Sc*<sub>2</sub> about twice its length from the tip of *Sc*<sub>1</sub>, *Rs* gently arcuated at origin, cell 1st *M*<sub>2</sub> unusually elongate, rectangular; basal deflection of *Cu*<sub>1</sub> near one-fourth the length of cell 1st *M*<sub>2</sub>.

Abdominal tergites yellow, segments 1 and 8 brighter yellow; base of segment 2 and the broad lateral margins of tergites 2 to 7 conspicuously dark brown; tergites each with four brown dots arranged in the form of a broad **V**, more evident on tergites 2 to 6, sternites obscure yellow, the second segment infuscated; sternites 2 to 7 with a pair of brown dots near mid-length. Ovipositor with the valves elongate, horn-coloured, blackened at base.

*Hab.* New Zealand (South Island).

*Holotype*, ♀, Governor's Bay, Banks Peninsula, Canterbury, October 5, 1921 (*J. W. Campbell*).

*Dicranomyia reversalis*, sp. n. .

General coloration yellow, the præscutum with three confluent dark brown stripes; pleura dark brown with a large yellow area on the mesopleura; wings greyish subhyaline, stigma dark brownish black; narrow brown seams along the cord; abdominal segments bicolorous, the base of each brown, the apex broadly yellow.

*Male*.—Length about 5 mm.; wing 6.5 mm.

*Female*.—Length about 5.5 mm.; wing 6.6 mm.

Rostrum and palpi black. Antennæ black, the flagellar segments of the male elongate-oval. Head grey.

Pronotum yellow. Mesonotal præscutum obscure yellowish pollinose, with three confluent, dark brown stripes; scutal lobes dark brown, the median area yellow,

scutellum testaceous; postnotum brown. Pleura dark brown, including the ventral half of the lateral sclerite of the postnotum; a large and conspicuous obscure yellow blotch on the mesepisternum and mesosternum, ventrad of the wing-root. Halteres brownish testaceous, the extreme base yellowish. Legs with the coxae and trochanters obscure greenish yellow; femora dark brown, more yellowish basally; remainder of the legs dark brown; claws with a long, slender, subbasal tooth. Wings greyish subhyaline, the stigma conspicuous, dark brownish black; paler brown seams at  $Sc_2$ , origin of  $R_s$ , along the cord and outer end of cell 1st  $M_2$ ; veins dark brown, paler in the infuscated areas, the veins here appearing somewhat bullate. Venation:  $Sc_1$  ending opposite the origin of  $R_s$ ,  $Sc_2$  some distance from the tip of  $Sc_1$ , the latter alone about one-third longer than the basal deflection of  $Cu_1$ ;  $R_s$  about one-half longer than the basal deflection of  $R_{4+5}$ ; cell 1st  $M_2$  small; basal deflection of  $Cu_1$  before the fork of  $M$ , the distance about equal to  $r-m$ .

Abdomen bicolorous, the basal half of the tergites brown, the apical half yellow, the brown narrower on the basal segments, becoming more extensive posteriorly, on the seventh and eighth segments only the narrow caudal margins are bright yellow; sternites similar, but the brown bases are correspondingly narrower. Ventral appendages of the hypopygium tinged with green, the rostriform appendage with two spines.

Female similar to the male. Tips of the femora indistinctly yellowish. Basal deflection of  $Cu_1$  at the fork of  $M$ . Ovipositor with the valves long and slender.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 10, 1921 (*T. R. Harris*).

*Allotype*, ♀, Taihape, October 12, 1921 (*T. R. Harris*).

*Dicranomyia reversalis* is related to *D. ricarians*, Schiner, but is readily told by the reversal of coloration of the abdominal segments.

### *Dicranomyia hemmelas*, sp. n.

General coloration yellow; mesonotal praescutum shiny black with broad lateral margins of the ground-colour; anterior part of vertex silvery; wings fulvous brown, the stigma slightly darker brown; abdominal sternites obscure yellow.

*Male*.—Length 5.8 mm.; wing 8 mm.

*Female*.—Length about 6.5 mm.; wing 8 mm.



Rostrum and palpi black. Antennae black, the flagellar segments oval. Head dull grey; a conspicuous area on the vertex behind the antennae covered with abundant, silver-white, appressed pubescence.

Pronotum black. Mesonotal praescutum yellow with three confluent black stripes, the lateral margins of the sclerite broadly yellow; scutal lobes black, the median area obscure yellow; scutellum pale brown, sparsely grey pruinose, more yellowish beneath; postnotum dark, sparsely pruinose. Pleura obscure yellow, the mesopleura very faintly pruinose. Halteres brown, the base of the stem narrowly yellow, the knobs dark brown. Legs with the coxae and trochanters yellow, remainder of the legs dark brown, the femoral bases obscure yellow. Wings with a uniform fulvous-brown tinge, the stigma slightly darker brown; veins dark brown. Venation:  $Sc_1$  ending opposite or just beyond the origin of  $R_s$ ,  $Sc_2$  retreated toward the wing-base,  $Sc_1$  slightly variable in length, in the holotype being longer than the basal deflection of  $R_{1+5}$ , in others a little shorter; basal deflection of  $Cu_1$  at or just before the fork of  $M$ .

Abdominal tergites dark brown, the sternites obscure yellow; hypopygium dark. Male hypopygium with the rostriform appendage bearing two stout, subequal, slightly separated spines. Ovipositor with the valves elongate.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dun Mt. Nelson, altitude 3000 feet, January 6, 1921 (A. Philpott).

*Allotopotype*, ♀, February 9, 1921 (R. J. Tillyard).

*Paratopotype*, ♀.

Type in the collection of the Cawthron Institute.

*Dicranomyia multispina*, sp. n.

General coloration shiny brownish yellow; antennae black; head brown; wings tinged with brown, the stigma oval, darker brown;  $Sc$  ending opposite or just beyond the origin of  $R_s$ ; abdominal tergites brown or indistinctly bicolorous; rostriform appendage of male hypopygium with a fascicle of about nine spines.

*Male*.—Length 6 mm.; wing 7 mm.

*Female*.—Length 8 mm.; wing 8 mm.

Rostrum brown, the palpi dark brown. Antennae black. Head brown.

Pronotum dark medially. Mesonotal praescutum shiny obscure yellow or brownish yellow, the median darker stripe

indicated only posteriorly; scutal lobes and postnotum slightly darker. Pleura obscure brownish testaceous. Halteres brown, the base of the stem paler. Legs with the coxæ pale yellowish brown; trochanters testaceous; femora and tibiae pale brown, the tarsi darker. Wings with a strong brown tinge, the stigma oval, darker brown; veins dark brown. Venation:  $Sc_1$  ending opposite or just beyond the origin of  $R_s$ ,  $Sc_2$  some distance from the tip of  $Sc_1$ , the latter alone variable, from one-half to nearly as long as the basal deflection of  $Cu_1$ ; cell 1st  $M_2$  closed, the basal deflection of  $Cu_1$  at the fork of  $M$ .

Abdomen pale brown, the sternites a little more yellowish. Usually both sternites and tergites appear faintly bicolorous, the bases being paler than the dark brown caudal margins of the segments. Male hypopygium with the rostriform appendage bearing, instead of the usual two spines, a fascicle of about nine such spines, the apex of the appendage beyond these spines long and slender.

*Hab.* New Zealand (both Islands).

*Holotype*, ♂, Ohakune, altitude 2060 feet, October 14, 1921 (*T. R. Harris*).

*Allotype*, ♀, Governor's Bay, Banks Peninsula, Canterbury, October 5, 1921 (*J. W. Campbell*); alcoholic.

*Paratopotype*, 1 ♂; *paratypes*, 15 ♂ ♀, with the allotype, alcoholic; 1 ♂, Dunedin (Waitati), Otago, October 24, 1921 (*M. N. Watt*).

*Molophilus luteipygus*, sp. n.

General coloration pale reddish brown; front yellow, vertex and occiput brownish grey; scutellum obscure yellow; postnotum and pleura dark brown; halteres yellow; wings with a strong yellow tinge; vein 2nd  $A$  elongate; abdomen dark brown, the hypopygium obscure yellow.

*Male*.—Length 2.8 mm.; wing 3.8 mm.

*Female*.—Length 3 mm.; wing 4.1 mm.

Rostrum pale brown, the palpi darker brown. Front yellow. Antennae dark brown, short, the flagellar segments oval with conspicuous verticils. Vertex and occiput dark brownish grey.

Pronotal scutellum almost white. Mesonotal praescutum reddish brown without distinct markings, more greyish laterally; scutum with the median area broadly obscure yellow, the lobes dark brown; scutellum obscure brownish yellow, darker basally; postnotum dark brown. Pleura dark brown. Halteres yellow, the knobs very conspicuous,

light yellow. Legs with the coxæ and trochanters obscure yellowish testaceous; remainder of the legs very pale brownish yellow, only the terminal tarsal segments conspicuously infuscated. Wings with a strong yellowish tinge; veins pale brown, *Sc*, *R*, *R*<sub>1+5</sub>, and *Cu* more yellowish. Venation: basal deflection of *Cu*<sub>1</sub> one-half longer than the deflection of *M*<sub>2+1</sub> and conspicuously arcuated; vein 2nd *M* elongate, ending opposite mid-length of the basal deflection of *Cu*<sub>1</sub>.

Abdomen dark brown, the hypopygium obscure light yellow. Male hypopygium with the basal pleural appendage a long straight rod, enlarged at base, the apex somewhat pointed, the apical quarter of the appendage sparsely provided with weak spines. Apical appendage a similar straight arm, the apex bifid by a deep U-shaped notch, the mesal arm a conspicuous, nearly straight, black spine, the lateral arm stouter, at its tip bent at an angle into a conspicuous spine directed mesad to almost touch the mesal arm; apex of pleurite on mesal side produced into a slender chitimized spine.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dunedin, Otago, November 5, 1921 (*G. Howes*).

*Allotopotype*, ♀.

*Paratopotypes*, 1 ♂ ♂, November 26–December 14, 1921; *paratypes*, 2 ♂ ♂, 1 ♀, Waipori, December 5, 1921 (*G. Howes*); 2 ♂ ♂, Mt. Fitzgerald, Banks Peninsula, Canterbury, January 24, 1922 (*E. S. Gourlay*); R. R.

*Molophilus terminans*, sp. n.

General coloration dark brown, the humeral region of the præscutum obscure yellow; antennæ short; halteres yellow; male hypopygium with the two pleural appendages terminal in position.

*Male*.—Length about 3 mm.; wing 1.8 mm.

*Female*.—Length about 4 mm.; wing 5 mm.

Rostrum and palpi dark brown. Antennæ short, dark brown. Head greyish brown with conspicuous yellow setæ.

Mesonotum dark brown, the humeral triangle obscure yellow; lateral margins of præscutum narrowly yellow; remainder of the mesonotum paler brown. Pleura brown. Halteres conspicuously light yellow, the knobs very bright. Legs with the coxæ and trochanters pale brownish testaceous; femora pale brown; tibiæ and tarsi dark brown. Wings with a faint yellowish-brown tinge; veins pale brown,

the macrotrichiae dark brown. Venation: vein *2nd A* long, sinuous, ending opposite the fork of *Cu*.

Abdomen dark brown. Male hypopygium with the pleural appendages terminal in position, consisting of an outer flattened blade that terminates in an acute beak, the surface with a short dense pubescence; inner appendage longer than the outer, very slender, feebly sinuous, the tip slightly enlarged and with a few weak denticles; mesal face of pleurite grooved to receive the pleural appendages. Penis-guard very long and slender, straight.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, November 13, 1921 (*T. R. Harris*).

*Allotopotype*, ♀, November 6, 1921.

*Paratopotypes*, 1 ♂. 2 ♀, November 15, 1921.

#### NOTHOPHILA, gen. nov.

Antennæ with sixteen segments; flagellar segments elongate-oval with short verticils that are shorter than the segments that bear them. Halteres elongate. Wings with *Sc* usually long, ending beyond the end of *Rs* (*nebulosa*, Edwards) to opposite the fork of *R*<sub>2+3</sub> (*fuscana*, Edwards); *Sc*<sub>2</sub> at the tip of *Sc*<sub>1</sub> and subequal to it; *r* close to the tip of *R*<sub>1</sub> and on *R*<sub>2</sub> beyond mid-length; *R*<sub>2+3</sub> as long as, or longer than, the basal deflection of *Cu*<sub>1</sub>; cell *M*<sub>1</sub> present; anterior areculus atrophied. Abundant macrotrichiae in all the cells distad of the cord, as well as in the centres of cells *C*, 1st *R*<sub>1</sub>, and *R*, and the distal ends of cells *M*, *Cu*, and 1st *A*. Valves of the ovipositor moderately elongate, the slender tergal valves gently upcurved.

Genotype:—*Utomorpha fuscana*, Edwards (New Zealand).

The two New Zealand species that Edwards has referred to *Utomorpha* are not congeneric with the five Nearctic species of the genus. *Utomorpha* has vein *Sc* shorter, *Sc*<sub>1</sub> ending before the fork of *Rs*; *r* far removed from the tip of *R*<sub>1</sub>, on *R*<sub>2</sub> before mid-length; cell *R*<sub>2</sub> sessile or very short-petiolate; cell *M*<sub>1</sub> present or (usually) absent; areculus complete. Verticils of the flagellum elongate as in *Pilaria*. The relation of *Nothophila* to other generalized Hexatomine genera in New Zealand is apparently analogous to that of *Utomorpha* to *Pilaria*, Sintenis.

#### LIMNOPHILA, Macquart.

##### MEFALIMNOPHILA, subgen. nov.

Characters as in *Limnophila*, s. s. Antennæ elongate.

Male hypopygium very complicated in structure, the mesal and apical faces of the pleurites produced into lobes; eighth sternite bearing two apical rows of spines. Ovipositor with the tergal valves very short, strongly upcurved, with a basal spur or tooth on the dorsal side.

Type of the subgenus:—*Limnophila howesi*, sp. n. (New Zealand).

The group also includes *Limnophila mirifica*, Alexander (North Island), *L. nigroapicata*, sp. n., and *L. producta*, sp. n. The very peculiar structure of the ovipositor probably indicates a specialized method of egg-laying.

*Limnophila (Metalimnophila) howesi*, sp. n.

General coloration grey; antennæ of male elongate; mesonotal præscutum obscure yellow with three brown stripes; pleura with a dark brownish-black dorsal stripe; wings tinged with brown; stigma conspicuous, dark brown; male hypopygium with the apex of each pleurite produced into a short broad lobe; outer pleural appendage clavate, terminating in a blackened hook-like spine; gonapophyses sinuous. Eighth sternite with two conspicuous rows of five spines each.

*Male*.—Length 6 mm.; wing 8 mm.

*Female*.—Length 7.5–8 mm.; wing 8.3–9.2 mm.

Rostrum and palpi dark brown. Antennæ elongate, if bent backward extending to mid-length of the abdomen; flagellum black, the scapal segments a little paler; flagellar segments elongate-cylindrical. Head dark grey.

Mesonotal præscutum obscure yellow with three ill-defined brown stripes that are confluent behind; scutum dark brown; scutellum and postnotum light grey. Pleura grey with a conspicuous brownish-black longitudinal stripe extending from the cervical sclerites across the dorsal pleurites, passing dorsad of the halteres; dorsal margin of this stripe ill-defined. Halteres pale yellow. Legs with the coxæ and trochanters light yellow, the fore coxæ a little darker; legs brown, the femoral tips narrowly darkened. Wings with a strong brown tinge, highly iridescent, the stigma well-defined, oval, darker brown; veins conspicuous, dark brown. Venation:  $Sc$  long,  $Sc_1$  ending opposite the deflection of  $R_{4+5}$ ,  $Sc_2$  a little longer than  $Sc_1$ ;  $Rs$  long, arcuated or feebly angulate at origin;  $r-m$  proximad of the deflection of  $R_{4+5}$ ;  $R_{2+3}$  in alignment with  $Rs$ , a little longer than the deflection of  $R_{4+5}$ ;  $R_2$  not conspicuously angulated at origin;  $r$  near mid-distance between the fork of  $R_{2+3}$  and

the tip of  $R_1$ ; veins  $R_2$  and  $R_3$  generally parallel, so cell 2nd  $R_1$  is very wide at margin; petiole of cell  $M_1$  only a little longer than the cell; basal deflection of  $Cu_1$  near mid-length of cell 1st  $M_2$ .

Abdomen dark brown, the hypopygium only a little paler. Male hypopygium with the ninth tergite not produced into lobes, the margin with a very broad notch; pleurites at apex on mesal face produced into a short subquadrate lobe that is truncated apically; on mesal face near mid-length the pleurites are produced into a smaller lobe that is truncated at apex. Outer pleural appendage clavate, the apex a squat, black, hook-like spine with a smaller subterminal spine; inner pleural appendage very small, pale, broadest basally. Eighth sternite with two convergent rows of five spines each. Gonapophyses sinuous, together appearing lyrriform.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dunedin, Otago, November 5, 1921 (G. Howes).

*Allotopotype*, ♀, November 26, 1921.

*Paratopotypes*, 2 ♂♂, with the allotype; *paratypes*, 1 ♂, 1 ♀, Mt. Grey, Canterbury, altitude 1200–1500 feet, in beech forest, November 27, 1921 (Campbell and Lyndsay).

This species is named in honour of the collector, Mr. W. George Howes, to whom I am greatly indebted for many Tipulidæ from Otago.

*Limnophila (Metalimnophila) producta*, sp. n.

*Male*.—Length 5.5 mm.; wing 7 mm.

*Female*.—Length 6.3 mm.; wing 7.5 mm.

Generally similar to *L. howesi*, sp. n., differing as follows:—

Size smaller. Basal flagellar segments indistinctly pale at ends. Median præscutal stripe distinctly divided by a pale median line. Pleural black line very distinct, rather narrow, both the dorsal and ventral margins very clear-cut. Legs with the femoral apices narrowly blackened. Wings not so strongly tinged with brown, the stigma pale brown but well-defined. Venation:  $Rs$  shorter than *L. howesi*; petiole of cell  $M_1$  variable in length, from one-fourth to a little more than one-half longer than the cell.

Caudal margin of the ninth tergite of the male hypopygium with two elongate, slender, slightly divergent lobes, separated by a deep U-shaped median notch. Pleurites at base on mesal face produced into a large tumid lobe, these

lobes contiguous on the median line; apex of each pleurite produced into a long slender arm directed mesad and slightly caudad, longer than the pleurite itself, the apex slightly enlarged; two pleural appendages, the outermost bifid, bearing a conspicuous lobule before the apex; inner appendage a flattened, irregular, pale blade. Gonapophyses appearing as long, slender, straight, divergent rods. Eighth sternite with two narrow convergent rows of black spines, there being about a dozen small spines in each row. Ovipositor with the tergal valves very short and strongly upcurved, the ventral margin at base microscopically serrulate.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dunedin, Otago. November 5, 1921 (G. Hours).

*Allotopotype*, ♀.

*Paratopotypes*. 2 ♂♂. with the type; 6 ♂♂, 1 ♀. November 26, 1921.

*Limnophila (Metalimnophila) nigroapicata*, sp. n.

Antennæ elongate; general coloration grey; mesonotal præscutum with three brown stripes; pleura with a dark brown longitudinal stripe; halteres elongate, light yellow; femora and tibiæ yellow, conspicuously tipped with black; wings yellowish subhyaline, veins pale; sigma very faintly indicated; *Rs* comparatively short; abdomen dark brown; tergal valves of ovipositor very short and strongly upcurved.

*Female*.—Length 7.2 mm.; wing 7.8 mm.

Rostrum and palpi black. Antennæ elongate for the female sex, dark brown; flagellar segments elongate; the antennæ of the male are undoubtedly elongate. Head yellowish grey.

Mesonotal præscutum yellowish grey with three conspicuous brown stripes, the median stripe feebly bisected by a paler line; cephalic margin of præscutum narrowly dark brown; tuberculate pits lacking; scutum light grey, the lobes darker grey; scutellum almost white; postnotum grey. Pleura grey; a conspicuous dark brown longitudinal stripe extending from the cervical sclerites, dorsad of the fore coxa, to the postnotum. Halteres elongate, light yellow. Legs with the coxæ yellow, the fore coxæ infuscated; trochanters obscure yellow; femora obscure yellow, the tips narrowly blackened; tibiæ and metatarsi yellowish testaceous, the tips more narrowly blackened; remainder of the tarsi brownish black. Wings yellowish subhyaline;

stigma very faintly indicated; veins pale brown. Venation:  $Sc_1$  longer than  $Sc_2$ , ending immediately before the end of  $R_s$ ;  $R_s$  rather short, gently arcuated at origin, in alignment with  $R_{2+3}$ ;  $R_2$  subperpendicular and angulated at origin;  $r$  faint, a little more than twice its length beyond the fork of  $R_{2+3}$ ; cells  $R_3$ ,  $R_5$ , and  $1st\ M_2$  in alignment; a spur on  $r-m$ , jutting into cell  $R$ ; petiole of cell  $M_1$  a little less than twice the cell; cell  $1st\ M_2$  elongate, gently widened distally; basal deflection of  $Cu_1$  near mid-length of the caudal face of cell  $1st\ M_2$ ; vein  $2nd\ A$  ending before the level of  $R_s$ .

Abdomen dark brown. Ovipositor with the tergal valves usually short, very strongly upcurved, the tips acute.

*Hab.* New Zealand (North Island).

*Holotype*, ♀, Taihape, Wellington Province, October 14, 1921 (T. R. Harris).

*Limnophila deviata*, sp. n.

General coloration light reddish brown; head grey; halteres yellow; legs dark brown, the femoral bases narrowly obscure yellow; wings yellowish subhyaline; veins  $R_2$  and  $R_3$  divergent, cell  $R_2$  being very wide at wing-margin; male hypopygium with two small pleural appendages, the outer one bifid at apex.

*Male*.—Length about 4.5 mm.; wing 5.6 mm.

*Female*.—Length 5.6–6 mm.; wing 6.3–6.4 mm.

Rostrum small, dark brown; palpi brownish black. Antennæ short in both sexes; scapal segments obscure brownish yellow beneath, dark brown above; flagellum dark brownish black, the segments oval. Head grey, the centre of the vertex slightly infuscated.

Mesonotal præscutum light reddish brown without distinct markings; tuberculate pits present, elongate; remainder of mesonotum pale reddish brown. Pleura pale brownish yellow. Halteres yellow. Legs with the coxæ and trochanters concolorous with the pleura; remainder of legs dark brown, the bases narrowly obscure yellow. Wings yellowish subhyaline, iridescent, the base and costal margin paler; stigma indistinct; veins pale brownish yellow. Venation:  $Sc_1$  ending beyond the fork of  $R_s$ ,  $Sc_2$  close to the tip of  $Sc_1$  and about equal to it;  $R_s$  long, arcuated at origin, in alignment with  $R_{2+3}$ ;  $r$  lacking or barely indicated;  $R_{2+3}$  about one-half longer than the deflection of  $R_{4+5}$ ; veins  $R_2$  and  $R_3$  divergent, cell  $R_1$  at margin being only a little wider than cell  $R_3$ , cell  $R_2$  correspondingly



widened; inner ends of cells  $R_3$ ,  $R_5$ , and 1st  $M_2$  in oblique alignment; cell  $M_1$  small, about one-half the length of its petiole; cell 1st  $M_2$  small, the basal deflection of  $Cu_1$  near one-third its length; vein 2nd  $A$  ending nearly opposite the origin of  $Rs$ .

Abdomen dark brown. Male hypopygium with two small pleural appendages, the outer appendage chitinized, with a small spine immediately before the slender apex; inner pleural appendage a little shorter, slender, fleshy. Ovipositor with the tergal valves elongate, gently upcurved.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Greymouth, sea-level, September 7, 1921 (T. R. Harris).

*Allotopotype*, ♀, September 6, 1921.

*Paratopotype*, ♀, September 7, 1921.

*Limnophila exclusa*, sp. n.

Mesonotum yellowish grey with three dark brown stripes; antennæ short; pleura light grey; wings tinged with yellow, sparsely marked with brown;  $R_{2+3}$  long; cell  $M_1$  lacking.

*Male*.—Length 11 mm.; wing 11 mm.

*Female*.—Length 12 mm.; wing 10.5 mm.

Rostrum and palpi black. Antennæ short, the basal segment dark pruinose. Head grey, the centre of the vertex extensively infuscated, restricting the ground-colour to narrow margins adjoining the eyes.

Mesonotal præscutum yellowish grey with three conspicuous dark brown stripes, the median stripe split caudally; scutum and scutellum light grey, the scutal lobes infuscated; postnotum light grey. Pleura light grey. Halteres yellow. Legs with the coxæ obscure yellow, sparsely pruinose; trochanters obscure yellow; femora and tibiæ brown, the tips passing into black; metatarsi dark brown, the tips blackened; tarsi black. Wings with a yellowish tinge, more saturated at the base and in the costal region; stigma conspicuous, brown; a brown seam at origin of  $Rs$ ; narrow brown seams along the cord and outer end of cell 1st  $M_2$ ; in the type the outer end of cell  $R_2$  is strongly infuscated; vein  $Cu$  and the wing-margin less distinctly infuscated; veins dark brown, more yellowish in the costal region. Venation:  $Sc_1$  ending just before the end of  $Rs$ ,  $Sc_2$  at the tip of  $Sc_1$ ;  $Rs$  long, angulated and spurred at origin;  $R_{2+3}$  long, only a little shorter than  $R_2$ ;  $r$  a little more than its length from the tip of  $R_1$  and on  $R_2$  less than its length beyond the fork of  $R_{2+3}$ ; cells  $R_3$ ,  $R_5$ , and 1st  $M_2$  in oblique alignment;

$r-m$  long, arcuated; cell  $M_1$  lacking; cell 1st  $M_2$  elongate, widened distally,  $m$  about one-half the outer deflection of  $M_3$ ; basal deflection of  $Cu_1$  about its own length beyond the fork of  $M$ ; anterior arculus preserved.

Abdominal tergites light brown, in the female darker brown; hypopygium concolorous with abdomen. Ovipositor very long and slender, yellowish horn-colour.

*Hab.* New Zealand (both Islands).

*Holotype*, ♂, Charteris Bay, Banks Peninsula, Canterbury, November 12, 1921 (*J. W. Campbell*).

*Allotype*, ♀, Ohakune, altitude about 2060 feet, November 12, 1921 (*T. R. Hurris*).

The holotype was associated with *Alphrophila neozelandica* (Edwards) and *Dicranomyia fuscata*, Hutton, on the lee side of rocks amidst rough foaming water.

### *Gynoplistia hirtamera*, sp. n.

General coloration shiny black; antennæ with fifteen segments; flagellar segments 1 to 8 long-flabellate; all coxæ light brown; wings subhyaline with a conspicuous brown pattern, including the cord, outer end of cell 1st  $M_2$ , bases of cells  $R'$  and  $M$ , origin of  $Rs$ , a large spot in cell  $M$  and another in cells  $Cu$  and 1st  $A$ ; wing-apex not darkened; cell 2nd  $R_1$  at margin equal in width to cell  $R_2$ ; vein 2nd  $A$  ending far before the level of the origin of  $Rs$ ; male hypopygium with each gonapophyse terminating in a dense brush of long yellow setæ.

*Male*.—Length 7.5 mm.; wing 6.8 mm.

Described from an alcoholic specimen.

Rostrum black, the palpi dark brownish black. Antennæ 15-segmented, the formula being  $2+2+6+5$ ; antennæ dark brown, the basal two flagellar segments indistinctly paler at ends; flagellar branches very long, the longest from three-fifths to two-thirds the entire flagellum; eighth flagellar segment with a pectination that is at least three times the length of the segment; terminal flagellar segment elongate, one-half longer than the penultimate. Head shiny black.

Mesonotal præscutum shiny black, the humeral region restrictedly reddish brown; scutal lobes black, the median area reddish brown; scutellum reddish brown with two confluent dark brown spots at base, on either side of the median line; postnotum black. Pleura dark brownish black; no pruinosity can be detected in the alcoholic type. Halteres pale yellow throughout. Legs with coxæ uniform

yellowish brown, the fore coxæ darker basally; trochanters obscure brownish yellow; femora light brown, the tips broadly brownish black; tibiæ dark brown, the tips blackened; tarsi black. Wings rather broad, subhyaline; cells *C* and *Sc* yellowish; a conspicuous dark brown pattern distributed as follows: bases of cells *R* and *M*; a large subcircular area at origin of *Rs*, remote from vein *M*; stigmal area large, sending a broad cloud along the cord, ending in a large blotch at the tip of *Cu*<sub>2</sub>; a large cloud at *m*; a conspicuous oval area beyond mid-length of cell *M*; an infuscation in centre of cell *Cu*, crossing vein 1st *A* into cell 1st *A* immediately above the end of vein 2nd *A*; wing-tip not darkened; veins dark brown. Venation: *r* at or before mid-length of vein *R*<sub>2</sub>, cell 2nd *R*<sub>1</sub> being unusually wide at the margin, equal to cell *R*<sub>2</sub>; *R*<sub>2</sub> strongly angulated at origin; *m* short to very short, constricting the adjoining veins; petiole of cell *M*<sub>1</sub> about two-thirds the cell; basal deflection of *Cu*<sub>1</sub> at from one-half to two-thirds the length of cell 1st *M*<sub>2</sub>; vein 2nd *A* short, ending considerably before the level of the origin of *Rs*.

Abdomen brownish black. Male hypopygium with the apex of each pleurite produced into a short blade as in this group of species; mesal face of pleurite at base produced into a conspicuous, flattened, glabrous blade directed caudad and slightly mesad, the apex obtusely rounded; mesal apical angle of pleurite likewise produced into a small blunt lobe that bears a few conspicuous setæ; inner pleural appendage dilated at apex. Gonapophyses broad at base, narrow at apex, which is split into a dense brush of long yellow hairs.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Waitati, Pipetine, Otago, October 29, 1921 (*G. Howes*).

*Gynoplistia niveicincta*, sp. n.

General coloration shiny brownish yellow; head shiny black; antennæ 20-segmented; femora yellow, the tips broadly and abruptly blackened; posterior tibiæ with a narrow, clearly-defined, whitish ring beyond mid-length, the setæ on this pure white; wings nearly hyaline, cells *Sc* and *Sc*<sub>1</sub> entirely dark brown; abdomen with intense purple reflections, the hypopygium obscure reddish yellow.

*Male*.—Length 10 mm.; wing 8.3 mm.

Rostrum very short, black; first segment of palpi obscure yellow, the remainder dark brown. Antennæ with the first segment yellow, the apex darker; second scapal segment

dark brown; flagellar segments, including the pectinations, black; antennæ 20-segmented, the formula being  $2+2+13+3$ , the pectination of flagellar segment 15 being comparatively small, flagellar segments short with a distinct apical neck, the longest pectination being approximately one-third the entire flagellum. Head entirely shiny coal-black.

Pronotum shiny yellowish brown. Mesonotal præscutum shiny obscure brownish yellow, with three darker brown stripes that are ill-defined; remainder of mesonotum shiny, obscure yellowish brown. Pleura brownish yellow, the mesepimeron and mesosternum between the mid and hind coxæ with a transverse line of silvery-white pubescence. Halteres pale brown, the knobs almost orange. Legs with the coxæ concolorous with the pleura; trochanters obscure yellow; femora bright yellow, the apical third (mid-femur) or half (hind femur) abruptly blackened; tibiæ black; posterior tibiæ with a clearly defined whitish ring just beyond mid-length, this band a little narrower than the black apex; setæ on this pale area white; tibial spurs slender, the apex acute, the distal margin weakly spinulose. Wings nearly hyaline; cells *Sc* and *Sc*<sub>1</sub> entirely dark brown; a conspicuous dark brown blotch at origin of *Rs*, extending to *M*; stigmal blotch large and compact, continued along the cord; centre of cell 1st *M*<sub>2</sub> clear; outer end of cell 1st *M*<sub>2</sub> and basal deflection of *Cu*<sub>1</sub> narrowly seamed with brown; an elongate-oval paler brown cloud just beyond mid-length of vein 1st *A*; wing-tip broadly but faintly infuscated; veins brownish black. Venation: *R*<sub>2</sub> perpendicular at origin; *r* near mid-length of *R*<sub>2</sub>; basal deflection of *Cu*<sub>1</sub> shortly before mid-length of cell 1st *M*<sub>2</sub>; vein 2nd *A* very strongly sinuous.

Abdomen shiny dark brown with intense violet and purple reflections; hypopygium, including all but the base of sternite 8, obscure reddish yellow. Male hypopygium with the pleurites short and stout, their mesal faces densely setiferous, the apex of each produced caudad and mesad into a rather long, flattened, setiferous blade; two pleural appendages, both slender and unspined. Gonapophyses appearing as very long, acicular, sinuous rods.

*Hab.* New Zealand (North Island).

*Holotype*, ♂, Ohakune, altitude 2060 feet, December 15, 1919 (T. R. Harris).

The type of *Gynoplistia niveicincta* was sent to Mr. Edwards for his expert opinion; he writes that this insect is certainly distinct from *speciosa*, Edwards, which has

brownish hind tibiæ covered with uniform dark brown pubescence, the pale ring being on the integument only; in *niveicincta* the setæ, as well as the integument, are pale. *G. formosa*, Hutton, is represented in the writer's collection by a male; it is a very different fly, with the tibial ring ill-defined, broad, and orange-yellow in colour.

*Tricyphona novæ-zelandiæ*, sp. n.

General coloration obscure yellowish brown; mesonotal præscutum with four narrow dark brown stripes; wings with a brown tinge, the stigma a little darker; cell  $R_2$  long-petiolate; cell  $R_4$  short-petiolate; cell 1st  $M_2$  closed; cell  $M_1$  sessile or very short-petiolate.

*Male*.—Length 6 mm.; wing 8.6 mm.

Rostrium and palpi dark brown. Antennæ 16-segmented, the scapal segments pale brown; flagellum black; flagellar segments oval. Head dark brown with a sparse bloom, leaving blotches of the ground-colour exposed.

Mesonotal præscutum light yellowish brown with four conspicuous dark brown stripes, the intermediate pair separated from one another by a line of the ground-colour that is nearly one-half the width of either stripe; scutum brown, indistinctly greyish medially; scutellum and post-notum pale brown with an indistinct pruinosity. Pleura brown with a sparse, microscopic, appressed pubescence that appears like a pruinosity; a narrow, dark brown, dorsal stripe extending from the propleura to ventrad of the wing-root. Halteres pale, the base of the stem yellow, the knobs infuscated. Legs with the coxæ obscure yellow, infuscated basally; trochanters obscure yellow; femora pale brown, the tips scarcely darkened; tibiæ and metatarsi pale brown, the tips narrowly darker brown; remainder of the tarsi dark brown. Wings with a brown tinge; cells *C* and *Sc* more saturated; stigma darker brown, but its limits ill-defined; veins dark brown. Venation:  $Sc_2$  before the origin of *Rs* a distance approximately as long as cell 1st  $M_2$ ; *Rs* strongly arcuated at origin;  $R_{2+3}$  elongate, the outer deflection of  $R_2$  a little more than its own length from the tip of  $R_{1+2}$ , without macrotrichiæ;  $R_{4+5}$  a little shorter than  $r-m$ ;  $r-m$  on  $R_{4+5}$  immediately beyond its origin; cell  $M_1$  short-petiolate or sessile,  $m$  in the base being exactly at the fork of  $M_{1+2}$ ;  $m$  about one-third the outer deflection of  $M_3$ ; basal deflection of  $Cu_1$  about one-fourth its length beyond the fork of  $M$ ;  $M_3 + Cu_1$  a little more than one-half the outer deflection of  $M_3$ .

Abdomen dark brown, the posterior margins of the sternites very narrowly and indistinctly paler; hypopygium conspicuously reddish brown.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Dunedin, Otago, November 5, 1921 (*G. Howes*).

The discovery of a species of the tribe Pediciini in New Zealand is of unusual interest. *Tricyphona novæ-zealandiæ* is in all its characters a typical member of the genus. The venation is interpreted as showing a distal fusion of  $R_1$  and  $R_2$ , the type of venation found in the Pediciini (for a discussion, see 'Entomological News,' vol. 29, pp. 201-205, 1918) and very possibly in other groups of Limnobiinæ, the *apparent* radial cross-vein in these cases being the free portion of vein  $R_2$ .

### Genus *HOLORUSIA*, Loew.

*ZELANDOTIPULA*, subgen. nov.

Characters as in *Holorusia*, differing as follows: vein  $M$  with a strong spur on the caudal side, jutting disto-caudad into cell  $M$ . Male hypopygium with the outer pleural appendage narrowed apically into a point. Gonapophyses appearing as deeply bifid plates, each lobe broadly rounded at apex.

Type of the subgenus:—*Holorusia novaræ* (Schiner).

The writer is quite prepared to follow Mr. Edwards in placing the *Tipula novaræ*, Schiner, in the essentially Neotropical genus *Holorusia*. The three species of the group from New Zealand known to the writer exhibit certain characters that seem to warrant their removal from typical *Holorusia* in some degree, and so the new subgeneric term, *Zelandotipula*, is proposed for these three New Zealand species. The writer is strongly inclined to believe that the conspicuous spur or stump of a vein in cell  $M$  is a character of some phylogenetic significance. Although it is lacking in some individuals, it is usually present as a strong spur, or, in some cases, as a more or less complete cross-vein in cell  $M$ . The course of the spur, and especially the slight cephalic deflection of the main vein immediately beyond it to form a symmetrical fork, leads one to the conclusion that the character is atavistic. In the specimens seen by the writer where the cross-vein is <sup>at least</sup> most nearly complete, the caudal portion of the vein, nearest vein  $Cu$ , is weak and not in alignment with the base of the spur. What this spur on  $M$  can represent in the phylogeny of the Diptera is a

question that future studies must answer. The other species belonging to this new group are *H. (Z.) fulva* (Hutton) and *H. (Z.) otagana*, sp. n. The species described by the writer as *Macromastix maori* is certainly not a member of this group, and likewise does not seem to be a true *Macromastix*. The presence of a spur on *M* in exactly the same position as found in the three species of *Zelandotipula* may indicate that both of these groups have descended from some Maorian ancestor in remote ages past. The discovery of the immature stages of *H. novaræ* by Mr. Gourlay is of unusual interest. The larvæ resemble those of *Holorusia* in general appearance, but the pupæ strikingly suggest species of *Prionocera*.

*Holorusia (Zelandotipula) otagana*, sp. n.

General coloration light grey; centre of vertex and median stripe of præscutum obscure rufous; wings relatively long and narrow, the pattern but faintly indicated; abdomen uniformly light brown; male hypopygium with the outer pleural appendage not produced into a conspicuous attenuate point.

*Male*.—Length 18–19 mm.; wing 19–22 mm.; wing-width 3·8 mm.

*Female*.—Length about 20 mm.; wing 17 mm.

Frontal prolongation of the head elongate, reddish brown; palpi dark brown. Antennæ with the scapal segments brownish yellow; flagellum black. Dorsum of head deep rufous, with a capillary dark brown median line; inner margin of eyes broadly cinereous.

Mesonotal præscutum light grey with three stripes, the median stripe obscure rufous, the lateral stripes varying from rufous to dark grey; scutum light grey, the centres of the lobes dark grey; scutellum and postnotum light grey with a capillary brown median line. Pleura light grey; dorso-pleural membrane obscure yellow. Halteres pale brown. Legs with the coxæ light grey; trochanters brownish yellow; femora and tibiæ light brown, the tips darkened; tarsi dark brown. Wings relatively long and narrow, subhyaline, with a subobsolete pattern, cells *C*, *Sc*, 2nd *R*<sub>1</sub>, *R*<sub>2</sub>, and *R*<sub>3</sub> being suffused with pale brown; outer ends of the posterior and anal cells faintly darkened; the subhyaline ground-colour includes cell *R*<sub>5</sub> to the apex; no conspicuous dark pattern along *Rs* or *M* as in *novaræ*. Venation: as in *novaræ*, but the cells longer and narrower, resulting from the narrowing of the wing.

Abdomen uniformly light brown, including the hypopygium. Male hypopygium very different in the details of structure from other known species of the subgenus. Ninth tergite with a profound median incision, the mesal face of the lobes formed obliquely truncated and densely set with abundant black spicules. Outer or dorsal pleural appendage flattened as in the genus, but the apex scarcely more than one-half as long as the dilated base, not at all prolonged into an attenuate lobe as in the genotype.

The female is smaller. The unique specimen of this sex at hand lacks the spur on vein *M*.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, Seaward Moss, near Invercargill, October 15, 1906 (*A. Philpott*).

*Allotype*, ♀.

*Paratopotypes*, 2 ♂♂, October 15, 1905; *Paratype*, ♂, West Plains, November 30, 1902 (*A. Philpott*).

*Macromastix subtenera*, sp. n.

*Male*.—Length about 7·5 mm.; wing 10·5 mm.

Related to *M. tenera* (Hutton), differing as follows:—

Size smaller. Antennæ more elongate, the flagellar segments beyond the first elongate-cylindrical, those near mid-length of the organ much longer than those at base. Head obscure yellow; a large brown area on either side of the vertex behind the eyes, only narrowly separated on the median line; no median dark line on the anterior part of vertex. Mesonotalpostnotum obscure yellow with the lateral margins of the median sclerite conspicuously margined with pale brown, the median pale area broad; in *tenera* there are two circular black spots on the posterior margin of the postnotum. Pleura with a continuous, but rather indistinct, transverse brown line on the anterior part of the mesepisternum, continued ventrad on to the mesosternum. Wings faintly tinged with brown. *Rs* a little shorter than in *tenera*; cell 2nd *A* a little narrower. Basal tergite dark; basal half of second tergite conspicuously light brown; remaining tergites with the pale median stripe as in *tenera*, but less distinct and conspicuously interrupted across the caudal margin of each segment by a narrow brownish-black margin to the sclerite, those cross-bars concolorous with the lateral stripes.

*Hab.* New Zealand (South Island).

*Holotype*, ♂, The Hump, Otago, altitude 3000 feet, December 24, 1915 (*A. Philpott*).



LIX.—*A few new African Cetoniine Beetles.*

By GILBERT J. ARROW, F.Z.S., F.E.S.

[Plate VIII.]

A FEW of the most noteworthy of the unnamed African species belonging to the subfamily Cetoniinae in the British Museum Collection are described in the following pages.

Genus *ANAGNATHOCERA*, nov.

Corpus nitidum, supra parcissime setosum, subtus cum capite sat dense villosum. Caput parvum. Clypeus antrorsum angustatus, apice acute bifidus, paulo reflexus. Pronoti basis utrinque leviter obliquatus, medio profunde excisus. Scutellum postice acute productum. Elytra post humeros vix sinuati, apice paulo producti, haud spinosi. Processus sternalis latissimus, planus, sutura meso-metasternali distinctissima.

♂. Tibia antica apice acuta, dente superiori obtusissimo, vix perspicuo. Abdomen subtus sulcatum.

♀. Tibia antica lata, tridentata. Elytra postice acute producti. Pygidium breve, valde obliquum. Abdomen convexum.

*Anagnathocera dispar*, sp. n. (Pl. VIII. figs. 1 & 2.)

Viridis, pronoti margine, elytris, vittis exiguis exceptis, pedibusque partim fulvis, abdominis subtus atque pygidii lateribus albo-maculatis; capite rugoso, erecte setoso, clypeo antice paulo attenuato, margine leviter reflexo, antice bidentato; pronoto medio parcissime, lateribus fortiter sat crebre, punctato, vix perspicue setoso. lateribus medio obtuse angulatis, ab hinc antice convergentibus, postice leviter divergentibus, lævissime sinuatis, basi haud lato, angulis obtusis, rotundatis; scutello modice elongato, postice acuminato; elytris seriato-punctatis, margine suturali costisque duabus discoidalibus leviter elevatis, lateribus post humeros lævissime sinuatis, apicibus paulo deplanatis, fortiter punctatis, setosis.

Long. 17–20 mm.; lat. 9 mm.

RHODESIA, Gazaland: Chirinda Forest (*G. A. K. Marshall*, October).

The insect here described, although discovered by Dr. Marshall as long ago as 1905, has remained undescribed owing to the difficulty of deciding its true systematic position. It exhibits a peculiar combination of features which separates it from every group of genera yet formulated in a subfamily the classification of which is exceptionally difficult and perplexing. Although its divergences from *Gnathocera* are considerable, it appears to me to have more in common

with that genus than with any other. The occurrence of a hairy clothing and of white chalky patches, the shape of the scutellum, acutely pointed but not concave at the sides, the more slender front tibia and grooved abdomen of the male, are features shared with that genus, and the sharply bidentate clypeus, although not of the form characteristic of *Gnathocera*, may be considered to be the more primitive type from which that of *Gnathocera* has been derived. The broad flat sternal process and the very feeble excision of the outer margins of the elytra suggest relationship to the *Ceratorrhina* group with horned males, but the form of the female, even more than that of the male, precludes that conclusion; while affinity with *Porphyronota* and allied genera is negated by the strongly accentuated sexual differences.

Perhaps the most distinctive of the many peculiar features of the new genus is the elongation and flattening of the extremities of the elytra, which entirely conceal the abdomen from above. The outer margins are minutely serrated on their posterior half and uniformly rounded to the sutural angle, which is sharp but not spiniform. In the angle there is a tuft of the pale-coloured setæ, which are extremely fine and scanty upon the remainder of the upper surface. The elongation of the elytra is more pronounced in the female than in the male. In addition to this the pygidium of the female is very oblique, the abdomen very convex, the tibiæ much stouter than those of the male, and the tarsi much shorter. The chalky-white patches are not present in the only female examined.

*Gnathocera nigrolineata*, sp. n. (Pl. VIII. fig. 3.)

Nigra, nitida, pedibus abdomineque rufis, albo-tomentosa, capitis medio, pronoti marginibus et lineis duabus longitudinalibus elevatis, scutello, linea mediana excepta, elytrorum marginibus et lineis duabus elevatis postice conjunctis, pygidii apice et linea mediana, corporis subtus linea mediana, femoribus partim, tibiis tarsisque totis nudis, capite pronotoque setis nonnullis minutissimis instructis, thorace subtus femoribusque sat parce fulvo-vestitis, abdomine nudo, processu sternali gracili, curvato. Long. 16 mm. ; lat. max. 8.5 mm.

FRENCH GUINEA: Koudia.

A single female specimen of this species was taken upon a termites' nest by Prof. F. Silvestri, by whom it has been presented to the British Museum.

It is a very distinct species, resembling no other at present known in the black and white striping of the elytra.

It has the size and general form of *G. trivittata* and the pattern of the head, pronotum, and scutellum is similar, but with the yellow lateral patches of the pronotum broader, leaving two rather irregular shining black stripes, which are finely and not closely punctured. The scutellum is moderately long, but not acute at the apex. The elytra are covered with whitish tomentum, except for a narrow shining marginal line and two narrow discoidal stripes, the first running from the base parallel to the sutural margin and the other from the humeral angle, meeting the first just before the apex. The pygidium is thinly pubescent, not shining, and has a rounded patch of yellow tomentum on each side. The body is covered with similar tomentum beneath, except for a quite smooth median line. The mesosternal process is slender and curved.

*Heterorrhina (Ptychodesthes) pygmæa*, sp. n.

Læte viridis, vel aureo-rufa, vel purpurea, tarsis nigro-piceis antennisque rufescentibus; modice elongata, nitidissima, capite longe flavo-hirto, clypeo plano, quadrato, margine antico vix sinuato, pronoto brevi, parce et distincte punctato, punctis lateralibus vix fortioribus, scutello lævissime punctulato, elytris sat regulariter striato-punctatis, striis geminatis, intervallis alternis fortiter elevatis, lævissimis, apicibus haud dense punctatis, pygidio lævi, convexo, minute et parce sat æqualiter punctato, processu sternali angusto, compresso, metasterno longe flavo-hirto, medio nudo, minute punctato, abdomine subtus parce punctato:

♂, tibia antica mutica; abdomine subtus anguste sulcato.  
Long. 15-18 mm.; lat. max. 7.5-9 mm.

GAZALAND: Chirinda Forest, 3800 ft. (*G. A. K. Marshall*, March, August).

This is the smallest so far known in the group of species to which it belongs, and is much more variable in colouring than the rest, which seem to adhere with great constancy to a particular shade of vivid green, softened by pinkish reflections in a certain light. The same colour is found in the present species, but a cobalt-blue changing to a rich purple is equally frequent, and our series includes one specimen of a fiery red. The borders of the pronotum are usually of a paler colour than the disc.

*H. pygmæa* most resembles *H. alternata*, Kl., but, in addition to its smaller size, is much more hairy, the head and the metasternum (except a small area in the middle of the latter, which is quite smooth) being clothed with long tawny hairs, that upon the head standing erect. The pygidium, on the other hand, is smooth and shining, and

has only a few scattered striolæ, the apical part not (as in *H. alternata*) more closely sculptured than the rest. The sternal process is very narrow, not at all flattened or dilated.

The description of Klug's species is quite inadequate, but the size and locality render my identification of it fairly certain and the former evidently excludes the new species, which is the one to which Klug's name is applied by Dr. Péringuey in his 'Catalogue of the Coleoptera of South Africa.'

*Charadronota eximia*, sp. n. (Pl. VIII. figs. 6 & 7.)

Nigra, clypei medio, pronoti marginibus lateralibus, singuli elytri maculis duabus parvis vel una magna, pygidii utrinque plaga magna, epimeris mesosternalibus, metasterno (medio excepto) abdominisque basi, lateribus et segmento penultimo, flavibus; paulo elongata, supra plana, lævigata, nitida, capite fere lævi sed fronte utrinque punctata, clypei margine antico fere recto, angulis acuminatis, pronoto sat angusto basi perpaulo dilatato, lævi, lateribus parce punctatis et strigosis, dimidio postico fortiter triangulariter excavato, marginibus lateralibus ante medium obtuse angulatis, antice et postice fere rectis; scutello lævi, angustissimo; elytris minutissime haud regulariter seriato-punctatis; pygidio leviter transverse strigoso, corpore subtus fere lævi, processu sternali brevissimo, rotundato.

Long. 19-21 mm.; lat. max. 10.5-11.5 mm.

UGANDA: Entebbe (Feb.), Tero (April).

Although similar in coloration to *C. quadrisignata*, G. & P., this is more nearly related to *C. pectoralis*, Bainb., but it is much larger and smoother than either. The pygidium and sides of the elytra are not opaque as in the allied species, the punctures of the pronotum are confined to its front and sides, and the depression upon the posterior half is much deeper and more sharply defined, and the angulation of the lateral margin is distinct but not sharp. The scutellum is very long and narrow, and the adjacent part of the elytra is only very slightly and narrowly depressed. The elytra are almost flat and smooth, with a very feeble puncturation. The pygidium is rather shining, rather feebly striolated, and the entire lower surface is very smooth and shining, with only a very few minute punctures at the sides.

There is one specimen of each sex. The male has the abdomen very slightly hollowed beneath and each elytron is decorated with a rather ill-defined transverse yellow bar, placed at the level of the apex of the scutellum and not

extending beyond the inner half, and a smaller comma-shaped mark towards the extremity. The female is a little more elongate in shape and each elytron bears a single large well-defined yellow patch upon its inner half, leaving only a fine black line at the suture, a rather narrow anterior border, and a broader posterior one. It is probable that the pattern is not distinctive of the sex, but that, as in the allied species, the coloration is very inconstant.

*Charadronota acutangula*, sp. n.

Nigra, nitida, epimeris metasternalibus maculisque utrinque abdominalibus læte fulvis; *C. pectorali* similis, sed metasterno nigro, lateribus grossius punctato pronotique lateribus antè medium acute angulatis.

Long. 16–18 mm.; lat. max. 8·5–10 mm.

KAMERUN: Dengdeng (April). UGANDA: Mabira Forest, Chagwe, 3500–3800 ft. (July, *S. A. Neave*), Budongo Forest, Unyoro, 3400 ft. (December, *S. A. Neave*).

This is a form representing *C. pectoralis*, Bainb., to the east of the region inhabited by that species, which is found from Sierra Leone to Lagos. It has a close resemblance to *C. pectoralis*, but is without the orange sides to the metasternum indicated by the name, the lateral angles of the pronotum are much more sharply produced, and the metasternum is more strongly punctured at the sides.

*Trichius sobrinus*, sp. n.

Grisco-tomentosus, corpore supra infusato, pronoti lateribus, elytrorum humeris, et interdum macula parva transversa mediana, pygidique apice pallidis, macula apicali antice tridentata, prothoracis lateribus medio fusco-maculatis; sat compactus, ubique dense brevissime setosus, capite lato, oculis parvis, clypeo fortiter bilobato, quam longitudinem latiori; pronoto brevi, utrinque acute spinoso, antice fortiter contracto, angulis anticis acutis, posticis obtusis, basi leviter rotundato; scutello magno, fere semicirculari; elytris deplanatis, conjunctim subquadratis, lateribus fere parallelis, humeris rectangulatis; pygidio lato, modice convexo, haud valde porrecto; pedibus haud longissimis, tibia antica robusta, inæqualiter tridentata:

♂, elytris medio immaculatis.

Long. 9–11 mm.; lat. 4·5–6 mm.

UGANDA, 3000–4500 ft.: Mabira Forest, Daro Forest (*S. A. Neave*), Ripon Falls.

There is evidently a marked similarity between this

and the West African *Trichius podicalis* and *tristiculus* of Kraatz, the only members of the genus hitherto known from Africa. It is larger than those species, the colour of the upper surface is not black, but a greenish-brown, and the pattern is different. The pronotum has no median stripe, the pale lateral border has a dark spot in the centre, and the elytra, instead of six scattered pale spots, as in *T. podicalis*, have only the humeral margin and (in the female) a small transverse median spot pale. The propygidium is pale and the pygidium is of the dark colour of the elytra, with the apex pale, the pale area ending above in three narrow finger-like rays.

The male is rather smaller, shorter, and more compact than the female, the thoracic border is more sharply defined, and the elytra are without the median spot. The latter difference is probably a constant one, five female specimens showing the pale mark, while two females are without it, and Mr. F. R. Mason informs me that this is so with another male in his collection. The three teeth of the front tibia are sharp in the male, the hind tarsi are slightly longer than those of the female, and the abdomen is a little less exposed beyond the elytra. The club of the antenna scarcely differs in length in the two sexes.

This insect (and probably also the allied species, *T. podicalis* and *tristiculus*, which are unknown to me) differs considerably from the other members of the genus in general appearance. It is more solidly built, the legs are shorter, the front tibiæ being very short and broad, with a strong third tooth placed at the middle of the outer edge or a little behind it. The hair of other *Trichii* is replaced by very short stiff setæ, which become broad scales upon the lower surface.

*Calometopus transparens*, sp. n. (Pl. VIII. fig. 5.)

Niger, elytris translucetibus, flavescenti-hyalinis, nigro-marginatis, corpore setis et squamis albidis supra et subtus ornato, pronoto utrinque maculis tribus discoidalibus duabusque marginalibus, abdominis dorso transverse fasciato, pygidioque vitta alba mediana, medio anguste bisecta; angustus, pedibus gracilibus, capite magno, clypeo subquadrato, antice valde bilobato, pronoto quam longitudinem paulo latiori, angulis obtusis; scutello longo, acuto; clytris deplanatis, setis longitudinaliter ordinatis instructis costaque humerali valida integra, postice attenuatis, apice rotundatis; pygidio ruguloso; pedibus gracilibus:

♂, clava antennali longiori; tibia antica angusta, acuminata, postica apice unispinosa; pygidio angusto. convexo:

♀, pronoto latiori; tibia antica acute tridentata, postica apice tridigitata, processibus intus longe ciliatis; pygidio longitudinaliter leviter sulcato.

Long. 10-12 mm.; lat. 5 mm.

NYASALAND: Mlange (*S. A. Neave*, Nov.-Feb.).

This species, although closely related to *C. hollisi*, Wat., has a peculiar aspect, due to the transparent hyaline elytra producing a mimetic resemblance to the wings of a small bee. The black margins and lines of black dots, upon which fine setæ are placed, simulate the venation, and, in conjunction with the white spots and bars upon the pronotum and abdomen, seemed designed to imitate the bees of the genus *Melecta* or some allied genus. Various species of these bees inhabit the same region and probably frequent the same flowers.

The head is like that of *C. nyassæ* and *hollisi*, deeply bilobed and clothed with rather scattered setæ. The prothorax is scarcely wider than the head across the eyes and a little shorter than it is long, with the front angles obsolete and the hind angles very obtuse, and the sides bluntly angulated before the middle. The upper surface bears irregularly scattered setæ, which broaden into scales arranged in five clusters on each side, one placed at each angle and the other three forming a triangle upon the disc. The scutellum is long and clothed with similar setæ. The transparent elytra have a yellow tinge, but the inner and outer margins, as well as the lateral costa and longitudinal lines of irregular dots, are black. The hyaline effect is due to the wings beneath being visible through the elytra, and the appearance of a bright yellow spot is produced on each side of the apex of the scutellum by a brush of long white hairs upon the metanotum showing through at that point. The pygidium is rugulose and bears two longitudinal bands of white scales narrowly separated.

The sexual differences of the genus *Calometopus* have never been described, most of the species having been hitherto represented by female specimens only, although the type of *C. hollisi*, Wat. (which I have not seen), is evidently a male. The remarkable trilobed hind tibia, regarded as a generic character by Blanchard in the original description, and since by Péringuey and Bourgoin, is a feature peculiar to the females.

*Calometopus luridus*, sp. n. (Pl. VIII. fig. 4.)

Niger, elytris luride brunneis, lateribus, apicibus lunulaque antemediana nigris, maculaque utrinque juxta-scutellari lacte flava, capite et pronoto albo-setosis, hujus setis utrinque in maculis 3 vel 4 aggregatis, pygidio longitudinaliter albo-fasciato; parum elongatus, oculis prominentissimis, clypeo subquadrato, antice haud fortiter bilobato; pronoto quam longitudinem vix latiori, angulis anticis obsoletis, posticis valde obtusis, lateribus antice convergentibus, postice parallelis; scutello longo acuto; elytris brevibus, deplanatis, sat fortiter haud regulariter punctatis, costa humerali valida integra, postice angustatis, rotundatis; pygidio sat lato, ruguloso; pedibus gracilibus:

♂, clava antennali longa, tibia antica breviter bidentata, postica apice unispinosa.

Long. 12.5 mm.; lat. 6 mm.

NYASALAND: Mlange (S. A. Neave, October).

A single male specimen.

*C. luridus* is nearly related to *C. transparens*, but is larger and less elongate in shape, and the elytra, although slightly shining and translucent, have not the complete transparency so remarkable in the last species. The clypeus is rather less deeply cleft than in that insect, the pronotum has a row of four white spots placed in a transverse line across the middle, and two behind these, forming a pattern rather different and a little less sharply defined than in *C. transparens* or *C. hollisi*. The elytra are brown with a slight lustre and coarsely punctured, the whole reflexed part being black, as well as an antemedian bar crossing the suture and produced forwards, forming an irregular crescent. Immediately in front of this bar is a bright yellow patch on each side, as in *C. transparens*, but only slightly transparent. The pygidium bears a median stripe of white setæ, broad at the base and tapering to the extremity, and the sides of the abdominal segments are decorated with white bars, as in all the allied species. In the bidentate front tibiæ of the male *C. luridus* differs conspicuously from both the allied forms.

## EXPLANATION OF PLATE VIII.

Fig. 1. *Anagnathocera dispar*, sp. n., male.

Fig. 2. Ditto, female.

Fig. 3. *Gnathocera nigrolineata*, sp. n., female.

Fig. 4. *Calometopus luridus*, sp. n., male.

Fig. 5. — *transparens*, sp. n., male.

Fig. 6. *Charadronota eximia*, sp. n., male.

Fig. 7. Ditto, female.



LX.—*Fishes from Tobago.* By J. R. NORMAN.

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THE collections of fishes made at Tobago by Mr. P. L. Guppy, and received from him during the last three years, contain examples of 150 species, one of which is described below as new to science. In addition, eight species were previously unrepresented in the Collection of the British Museum (Natural History); of these, five require a new description.

*Clinus guppyi*, sp. n.

Depth of body  $3\frac{2}{3}$  in the length, length of head  $3\frac{1}{4}$ . Snout shorter than diameter of eye, which is  $3\frac{1}{3}$  in length of head, and more than twice the interorbital width. Head naked. Snout rounded; jaws equal anteriorly; maxillary extending to below posterior third of eye. Outer teeth of both jaws strong, conical, curved inwardly; a band of villiform teeth behind these anteriorly; vomer with a V-shaped patch of moderate teeth; band on palatines short. Nostril with a tufted filament; orbital tentacle rather small; a series of hair-like filaments on each side of the neck. Five or six short gill-rakers on lower part of anterior arch, those near the angle bifid at their extremities. Vertical fins not scaly. Dorsal XIX 11; spines gradually increasing in length to the seventh, thence subequal to the fifteenth, which is  $\frac{2}{3}$  length of head; seventeenth and eighteenth shorter; soft fin rounded; rays much longer than the spines. Anal II 18; commencing below eleventh or twelfth dorsal spines. Pectorals slightly shorter than head. Pelvics shorter, inserted just behind level of posterior margin of præoperculum. Caudal rounded. Caudal peduncle short, its length  $\frac{1}{4}$  length of head.  $5\frac{1}{2}$  scales from anterior dorsal spines to lateral line. Reddish brown, with indistinct darker vertical bands. Cheeks mottled with darker. A large dark opercular spot, and an indistinct spot superiorly in axil of pectoral. Pectorals, caudal, soft dorsal, and posterior part of anal with dark spots along the rays.

A single specimen, 90 mm. in total length.

Near *C. nuchipinnis*, Quoy and Gaimard, differing especially in the form of the dorsal fin.

*Calamus macrops*, Poey.

Depth of body  $2\frac{1}{4}$  in the length, length of head  $3\frac{1}{3}$ . Snout  $1\frac{1}{3}$  diameter of eye, which is  $3\frac{1}{2}$  in length of head

and  $1\frac{1}{4}$  in interorbital width. Anterior profile steep and nearly straight. Snout and interorbital space naked. Præ-orbital deeper than eye; distance from eye to end of maxillary  $2\frac{1}{2}$  in length of head. Anterior teeth acute, with 10–12 small canines in each jaw. Lateral teeth in three rows in upper jaw, the outer obtusely conical, the others molariform; two rows in lower jaw. Maxillary scarcely reaching vertical from anterior margin of eye. Six short gill-rakers on lower part of anterior arch. Dorsal XII 12; third spine longest, nearly  $\frac{1}{2}$  length of head; first soft ray  $\frac{1}{2}$  length of head. Anal III 10; third spine longest, equal to diameter of eye, shorter than soft rays. Pectoral longer than head, almost reaching origin of anal. Pelvics  $\frac{2}{3}$  length of head. Caudal forked. 47 scales in lateral line, 6 from origin of dorsal to lateral line. Greyish silvery; a silvery streak below the eye; fins pale, spinous dorsal with dark edge; a dark spot superiorly in axil of pectoral.

A single specimen, 200 mm. in total length.

*Upeneus parvus*, Poey.

Depth of body  $4\frac{1}{4}$  to 5 in the length, length of head  $3\frac{2}{3}$  to  $3\frac{3}{4}$ . Snout slightly longer than diameter of eye, which is  $3\frac{1}{2}$  to  $3\frac{2}{3}$  in length of head. Interorbital region flattish, its width equal to diameter of eye. Lower jaw slightly the shorter; maxillary reaching to below anterior third of eye. Teeth very small, conical, in two series anteriorly and a single series laterally. Barbels reaching angle of præ-operculum when laid back. Gill-rakers slender, about 18 on lower part of anterior arch. Dorsal VII, I 7–8; spines slender, first longest,  $\frac{3}{5}$  length of head and  $1\frac{1}{3}$  longest soft rays. Anal II 6; longest soft rays equal to those of second dorsal. Pectoral  $\frac{3}{4}$  length of head, barely reaching beyond tips of pelvics. Caudal deeply forked. Brownish above, fading to white below; a yellowish longitudinal band along the side; fins pale, caudal with three or four dark oblique bars on each lobe.

Three specimens, 70–90 mm. in total length.

CENTROCHROMIS, gen. nov.

(Type, *Glyphidodon rudis*, Poey.)

Agrees closely with *Glyphidodon*, but is distinguished by having the præoperculum coarsely serrated.

*Centrochromis rudis.*

*Glyphidodon rudis*, Poey, *Memorias*, ii. p. 191 (1860); Günther, *Cat. Fish.* iv. p. 37 (1862).

*Abudefduf rudis*, Jordan and Evermann, *Bull. U.S. Nat. Mus.* xlvii. p. 1563 (1898).

Depth of body  $1\frac{3}{4}$  to 2 in length, length of head  $3\frac{1}{3}$  to  $3\frac{1}{2}$ . Snout slightly longer than diameter of eye, which is  $3\frac{1}{3}$ – $3\frac{2}{3}$  in length of head and  $1\frac{1}{4}$  to  $1\frac{1}{2}$  in interorbital width. Snout and lower jaw naked. Maxillary extending to vertical from nostril. Teeth in a single series, equal, all deeply bifid. Præoperculum coarsely serrated; operculum with a flat spine. Dorsal XIII 12; fourth to sixth spines longest,  $\frac{2}{3}$  to  $\frac{1}{2}$  length of head, shorter than longest soft rays; soft fin obtusely angular. Anal II 10; second spine strong, nearly  $\frac{1}{2}$  length of head. Pectoral nearly as long as head. Pelvics scarcely reaching vent. Caudal emarginate, with rounded lobes. Caudal peduncle twice as deep as long. 25–27 scales in a longitudinal series,  $3\frac{1}{2}$  from origin of dorsal to lateral line. Five broad dark vertical bands on body, wider than the interspaces; a black spot superiorly in axil of pectoral.

Five specimens, 115–180 mm. in total length.

*Microspathodon chrysurus*, Cuv. & Val.

Depth of body 2 in the length, length of head  $3\frac{1}{4}$  to  $3\frac{1}{3}$ . Snout longer than diameter of eye, which is  $3\frac{3}{4}$  to 4 in length of head. Interorbital space convex, its width  $1\frac{1}{2}$  times diameter of eye. Præorbital broad, deeply notched, its depth above angle of mouth 1 to  $1\frac{1}{4}$  times diameter of eye. Lower jaw slightly shorter than upper; maxillary extending to vertical from nostril. Teeth in both jaws flat, sharp, movable, in a single series; in the lower jaw twice as large as in the upper. Head entirely scaly, except the lower jaw. Dorsal XII 15–16; spines gradually increasing from the first, last  $\frac{1}{2}$  length of head; soft fin angular. Anal II 13–14; second spine about  $\frac{1}{2}$  length of head. Pectoral as long as, or slightly longer than, head. Pelvics reaching vent or slightly beyond, but not to anal. Caudal forked; upper lobe longer than lower. Caudal peduncle nearly twice as deep as long. 29 scales in a longitudinal series,  $3\frac{1}{2}$  from origin of dorsal to lateral line. Brownish; scales on body with darker edges; some white spots scattered on head and nape, and to a lesser extent on back and scales of dorsal fin. Dorsal, anal and pelvic fins dusky; caudal yellow.

Two specimens, 147 and 135 mm. in total length.

*Batrachoides cryptocentrus*, Cuv. & Val.

Depth of body  $4\frac{3}{4}$  to  $5\frac{1}{2}$  in the length, length of head 3 to  $3\frac{1}{4}$ , width of head between opercles  $3\frac{1}{2}$  to  $3\frac{3}{4}$ . Diameter of eye 5 to 6 in length of head, equal to or slightly less than interorbital width. One subopercular and two opercular spines. Maxillary extending beyond eye. Lower jaw a little projecting. Teeth on vomer and palatines large, uniserial, obtusely conical; 4 on vomer, 10 to 13 on each palatine; lower jaw with a single series of similar teeth, and anteriorly a patch of sharper teeth; premaxillaries with two rows of villiform teeth. Head and body entirely naked; head covered with small filaments, that above the eye well developed. Snout with a fringe of filaments; another fringe on lower jaw, four of which are distinctly larger than the remainder. From above and below base of pectoral two rows of open pores, appearing as white spots, which become indistinct in the adult, extend backward nearly to end of soft dorsal and anal respectively. Dorsal III 26-28; spines short, almost entirely hidden under the skin. Anal 22. Pectoral 21; a pigmented patch in the axil, but no foramen. Caudal 13, rounded. Brownish, paler below, with traces of darker vertical bands, disappearing in the adult; fins edged with darker. In young and half-grown individuals the throat is marbled with pale irregular spots.

Three specimens, 70-220 mm. in total length.

LXI.—*Note on the Forward Progression in its Shell of the Animal of the Nautiloidea and Ammonoidea.* Compiled from Notes left by the late G. C. CRICK, F.G.S., by B. B. WOODWARD, F.L.S.

THE three facts which are necessary to remember when attempting to form a conception of the mode of growth in the Nautiloidea and Ammonoidea are :—

- (1) Growth in bulk of the animal taking place at regular intervals, terminated respectively by the formation of a new septum.
- (2) Rigidity of the shell, necessitating a forward movement of the too bulky animal.
- (3) Faculty of secreting gas, which must not be allowed to escape from the chambers of the shell.

It has been suggested that the formation of successive septa in the shells of these animals is correlated with the recurrence of reproductive periods; but Dr. Wiley\* states definitely that this is not the case in *Nautilus*, since propagation, according to his observations, only takes place after the last septum has been formed (p. 747).

*Nautilus* is an expert and a rapid swimmer, owing to the bouyancy given to the relatively large external shell by its series of air-chambers. These chambers are not individually air-tight, since they are perforated by the siphuncle, the walls of which are permeable†, but collectively they are rendered an air-tight and water-tight hydrostatic apparatus, owing to the fact that the animal itself completely closes up the entrance to the chambers in virtue of its adherence to the shell by the muscles and annulus (girdle of Owen).

The method of formation of the septa, Dr. Willey writes (p. 749), "is simple so far as the septum itself is concerned. What is not so easy to understand is the manner in which the animal glides bodily forwards in its shell, so as to leave a space behind it which is destined to become the new air-chamber. . . . (p. 750). Keferstein (1865) and Appellöf (1893) supposed that the mechanism of the forward movement of the muscles in the shell consisted of a resorption of muscular substance of the hinder border, coincident with a formation of fresh muscular substance in front. But this pretended resorption of muscle-fibres could not be confined to the ends of the muscles, where they abut upon the shell, but must affect the entire body of the muscles. There is no evidence whatever that anything of the kind takes place, since the muscles increase in size *pari passu* with the growth of the animal, and the presence of the concentric muscle-lines on the shell, visible as they are from the septal suture to the anterior border of the muscle-scar on each side, is clearly indicative of a very gradual forward gliding of the animal. As the animal grows it must of necessity move forwards within the rigid walls of the shell, since the increase in size takes place in every direction, quite as much in girth as in length. At the same time the soft visceral sac can accommodate itself to a certain extent to straightened circumstances, sufficiently to avoid any sudden catastrophic movement, and, meanwhile, gas is secreted by or through the thin *septal area* of the mantle, and when the limit of growth at any particular period is reached, a new system is laid down."

\* Zool. Results, pt. vi. (1902), from which paper many of the following notes are taken.

† Brooks, Proc. Boston Soc. Nat. Hist. xxiii, 1888, p. 380.  
*Ann. & Mag. N. Hist.* Ser. 9. Vol. ix. 35

The mode of progression of the Ammonite animal in its shells must, obviously, have been similar to that just described for *Nautilus*. In the case of an Ammonite with a comparatively simple septal suture, or when the anterior part of each lobe is relatively broad, the process presents but little difficulty; when, however, the septal suture is very complicated, and especially when the anterior part of each lobe is considerably contracted, the mode of progression of the animal in its shell at first sight presents some difficulty. An easy and satisfactory explanation is, however, possible. This explanation presupposes the attachment of the animal to its shell by means of shell-muscles and an annulus like the living *Nautilus* as described in a paper to the Linnean Society (Trans. Linn. Soc. ser. ii. (Zoology), vol. vii. pp. 71-113). The marks left by the anterior edge of the annulus (anterior aponeurotic band) on the inside of the shell indicate that the animal progressed forward at an even rate.

The digitations visible at the septal sutures when traced towards the centre of each septal surface rapidly die out and give place to a much more simply curved surface. During the formation of a septum the visceral hump of the animal was attached to the shell-wall, not only by the boundary of that part of the hump engaged in the formation of the septum, but also by the shell-muscles and the annulus, the forward growth of the animal in its shell being temporarily suspended. On the completion of the septum and the renewed onwards growth of the shell-muscles and annulus, room would be given to the animal to contract the posterior portion of the visceral hump inwards, and thus release and withdraw all the fine digitations of the mantle from the crumpled edge of the septum. When the creature had advanced sufficiently far forward in its shell, further progress was temporarily suspended, the mantle digitations were again pressed outwards against the shell-wall, and the next septum formed.

In some cases, when an adequate interval has not been attained, this results in the backward extensions (=lobes) being pressed upon the forward extensions (=saddles) of the preceding septal suture, so that the resultant successive septal-suture lines are crowded on each other to such an extent as to be difficult to follow out. Such a case is well shown in the figure given by Pervinquière of a specimen of *Mortoniaceras proratum*, Coquand (Carte Géol. Tunisie.—Études Paléont. Tunisienne. I. Céphalopodes terr. Sécond. 1907, p. 238, fig. 97), and again (p. 298, fig. 114) in an example of *Acanthoceras aumalese*, Coquand. These cases are in all probability pathological.

LXII.—On some new or little-known South African Grasshoppers of the Subfamily Acridinæ (Orthoptera). By B. P. UVAROV, F.E.S., Assistant Entomologist, Imperial Bureau of Entomology.

THIS is the third paper of the series\*, based on the collection sent to the Imperial Bureau of Entomology by the Division of Entomology, Pretoria, and by Prof. J. C. Faure. The types of all species described are in the British Museum, and paratypes preserved in the collections of the said Division and of the Transvaal University College.

I see no reason whatever to call the subfamily Truxalinæ, as the name *Truxalis* is not used now, being a pure synonym of *Acrida*.

### 1. *Leva recta*, Karny.

1910. *Paragymnobothrus rectus*, Karny, Denkschr. Medic.-Naturw. Ges. Jena, xvi. Bd ; L. Schultze, Zool. & Anthr. Ergebn. Reise in W. & Z. Sudafrika, Bd. iv., Lief. i, Insecta, p. 80. no. 115.

1902. *Cutantops vittata*, Kirby, Trans. Ent. Soc. London, p. 106. no. 111 (ad partim).

It is quite obvious from Karny's description of *Paragymnobothrus rectus*, which should be considered as the type-species of the genus, that the latter belongs not to the section Phlæobæ, where I. Bolivar (Trab. Mus. Nac. Madrid, ser. Zool., No. 20, p. 73, 1914) has placed it, but to the Chrysochraontes (I. Bolivar, *l.c.* p. 61), since the elytra in *Paragymnobothrus rectus* have the scapular area dilated ("area costali et præcostali in utroque sexu sat dilatatis," Karny, *l.c.*). The study of the specimens now before me, which agree perfectly with Karny's description and undoubtedly belong to his *P. rectus*, shows also that the lower margin of the lateral lobes of pronotum is strongly sinuate, which again indicates that the genus belongs to Chrysochraontes. In this section it comes near to *Leva*, Bol., having the temporal foveolæ only incompletely margined from below, and, in fact, the relationship of *Paragymnobothrus* to *Leva* is so close that I think it would be quite correct to unite them, the more so that, in the two more new South African species described below, the relationship to the Indian representatives of the genus *Leva* is still closer than in *Leva recta*, Karny.

\* See Ann. & Mag. Nat. Hist. (9) viii. pp. 369-392 and ix. pp. 99-113.

I have before me several specimens of *L. recta* from Pretoria, taken by W. L. Distant and named by W. F. Kirby, mostly as *Gymnobothrus linea-alba*, Bol. (Kirby, *l. c.* p. 69), partly as *Duronis tricarinata*, Bol. (Kirby, *l. c.* p. 67), while one specimen is a cotype of *Catantops* (!) *vittata*, Kirby (*l. c.* p. 106)\*. Three females were sent in by the Division of Entomology, Pretoria, from Bloemfontein, 24.ii.1918. H. Kary recorded the species from Bechuanaland.

2. *Leva callosa*, sp. n.

♂. Small and slender. Antennæ extending only a little beyond the hind margin of the pronotum, rather thick. Head strongly reclinate; frontal ridge in profile slightly convex, sulcate throughout; its margins touching each other at the fastigium, gradually divergent downwards, distinctly thickened between the antennæ where the ridge appears, therefore, somewhat dilated, and disappearing just before the clypeus. Face slightly punctured. Temporal foveolæ completely vertical, scarcely margined from below, distinctly concave, a little longer than the width at the hind margin, trapezoidal. Fastigium of the vertex strongly prominent, elongato-pentagonal, with the apical angle acute, slightly rounded; its surface strongly concave. Pronotum with the median keel in profile straight, well developed, cut by the transverse sulcus not far behind the middle; lateral keels well developed throughout, in prozona subparallel, very feebly concave, in metazona slightly divergent. Fore margin of the pronotum widely rounded; hind margin very obtusely angulate, with the angle rounded. Lateral lobes higher than long; their fore lower angle obtuse; the hind angle straight, but very widely rounded; a small oval callosity just below and behind the middle of the lobe; the fore margin incrassate and callous along the lower two-thirds of its length and emitting an obliquely ascending short callous ridge from the upper end of that incrassation. Elytra as long as the abdomen, but not reaching the hind knees, distinctly dilated in the middle, with the apex attenuate; mediastinal area reaching about the middle of the fore margin, with a distinct postbasal dilatation and a short, irregular, false vein; scapular area reaching to the apical fourth of the fore margin, strongly dilated behind its middle, with a few rather regular oblique veinlets; externo-median

\* Other cotypic specimens, including the actual type of *C. vittata*, marked by W. F. Kirby himself, are conspecific with *Phorisa squalus*, St., and two with *Ph. capensis*, Walk.



area extending a little beyond the apex of the scapular area, in the apical half dilated and parallel, with sparse transverse veinlets; discoidal area rather broad, extending over the basal two-thirds of elytra, almost parallel-sided, only slightly narrowed and recurved apically, sparsely reticulate, with one row of irregular cells; interulnar area distinctly more narrow than the discoidal area, sparsely but irregularly reticulate, with only one row of cells; the apical part of elytra very sparsely reticulate.

General coloration pale greyish buff. Head with a very feeble greyish longitudinal fascia above, and with broad, shining, black, postocular fasciæ widened posteriorly. Pronotum unicolorous on the upper side; lateral lobes velvety-castaneous in the upper half and of the general colour below, the boundary between the two colours being very indefinite; the callosities on the lateral lobes are pale. Elytra hyaline, with the veins ochraceous; the discoidal area with indefinite and scarcely distinct grey spots. Wings infumate at the apex. Front and middle legs ochraceous with several indistinct grey bands. Hind femora with two oblique grey fasciæ on the upper side, extending on to the inside as well; the outer face of the general colour, with a few grey streaks along the lower margin; the knees greyish brown. Hind tibiæ pale greyish, with the spines brown apically. Abdomen yellowish beneath and slightly rufous on the sides.

♀ (paratype). Differs from the male in the following characters:—Antennæ not reaching the hind margin of the pronotum. Frontal ridge below the ocellum scarcely sulcate, punctured. Elytra with the scapular area less widened than in the male, but regularly reticulate; the discoidal and interulnar areas subequal in width, sparsely reticulate, with two rows of cells, separated by irregular false veins. General coloration paler, and therefore the markings on the lateral lobes of the pronotum are better defined. Hind tibiæ greyish. Abdomen not rufous on the sides.

	♂ (type).	♀ (paratype).
	mm.	mm.
Length of body .....	11	16
" pronotum .....	2.5	3
" elytra ... ..	8	10
" hind femora ....	7.5	9

The type and eight paratypic specimens are from Bloemfontein, Orange Free State, 11.ii.–11.iv.1918; one female is from Boshof, 17.v.1917, and another from Bethulie,

8. iv. 1918. The general coloration varies and in some males it is greyish, with the brown and pale marks on the pronotum scarcely distinct. The bands on the upper side of the hind femora may be more or less pronounced or obliterated; the outer face of these femora is sometimes dark along the upper margin.

### 3. *Leva parva*, sp. n.

♂. Of the size and habitus of *L. callosa*, and differing from the latter by the following characters only:—Fastigium of the vertex more sharply pointed. Lateral keels of the pronotum gently, but distinctly, incurved in the middle of the prozona, dilated and strongly divergent in metazona; lateral lobes of pronotum without callous incassation of their fore margin. General coloration greyish-ochraceous; lateral keels of pronotum ivory-coloured, margined in metazona from inside by the velvety-castaneous fasciæ; lateral lobes blackish alongside the lateral keels, indefinitely marmorated with brown elsewhere, with an ivory callous spot behind and below the middle; the coloration of other parts much the same as in *L. callosa*, but the sides of the abdomen not rufous.

♀ (paratype). Differs from that of *L. callosa* by the shape of the lateral keels of the pronotum and by the coloration.

	♂ (type). mm.	♀ (paratype). mm.
Length of body .....	11	16
"    pronotum .....	2.75	3.5
"    elytra .....	8	10
"    hind femora ....	7	9

The type and twenty-one paratypic specimens are all from Bloemfontein, Orange Free State, taken 13. ii.—19. v. 1918; one more female is from Boshof, 17. v. 1917. They are rather variable in coloration, but easily recognisable by the shape of the frontal keels, which are always margined with black or brown on the outside, and in metazona on the inside as well.

### LOUNSBURYNA, gen. nov.

Small, but not slender, somewhat recalling *Dociostaurus* in its habitus, though much smaller than any species of that genus. Antennæ slightly compressed dorso-ventrally, in the male extending a little beyond the hind margin of the pronotum, in the female scarcely reaching it. Head distinctly

thicker than the pronotum and prominent above. Face distinctly reclinate, forming an acute, but widely rounded angle with the fastigium of the vertex. Frontal ridge in profile straight, regularly and gradually widened towards the clypeus, almost reaching the latter, sulcate throughout, its sulcus confluent with the upper impression of the fastigium of the vertex. Fastigium of the vertex distinctly sloping, in the male longer than broad, in the female as broad as long, its margins strongly convergent forwards and running over to the front as the lateral margins of the frontal ridge; the surface of the fastigium impressed, more so in the male. Temporal foveolæ undeveloped; the sides of fastigium vertical, high. Pronotum short and thick, distinctly, though broadly, constricted before its middle; fore margin very widely rounded; hind margin obusangulately rounded: median keel very feeble in prozona, more raised in metazona, cut by the transverse sulcus in the middle; that sulcus is deep and straight, while the anterior sulci are scarcely perceptible on the disc; lateral keels strongly incurved, distinctly raised in the fore part of prozona only, disappearing between the sulci, very low, but clearly indicated by ivory-coloured callosities in the metazona; surface of the disc distinctly rounded, especially so in the prozona; lateral lobes higher than long, with the lower margin sinuate. Mesosternal lobes and their interspace decidedly transverse in both sexes, more so in the female. Metasternal lobes in the male distinctly, in the female widely separated. Elytra extending a little beyond the hind knees, hyaline throughout; the discoidal field without an intercalate vein. Wings broad; radial veins incrassate; discoidal area widened in both sexes, but much more so in the male. Fore and middle femora in the male distinctly incrassate. Hind femora in the male slightly incrassate, in the female more slender, gradually narrowed towards the apex. Hind tibiæ slightly widened apically, rounded, armed with eight outer and ten inner spines; inner apical spurs about twice as long as the outer ones, but subequal to each other, strongly curved.

Genotype: *Lounsburya capensis*, sp. n.

This is a member of the essentially New World group Orphulæ, which is represented in the Eastern hemisphere by only three known genera—*Calephorus*, Fieb., *Froggattia*, Bol., and *Comacris*, Bol.; there is no doubt that the South African fauna includes more undescribed genera.

I have much pleasure in dedicating this genus to Mr. Chas. P. Lounsbury, Chief of the Division of Entomology, Pretoria.

4. *Lounsburya capensis*, sp. n.

♂. Brownish grey, with whitish and grey markings. Face with grey and brownish punctures and marmoration; cheeks whitish; occiput with a somewhat paler longitudinal fascia between two narrow and indefinite brown lines; a narrow, pale, postocular line. Lateral keels of the pronotum callous, ivory-white, and strongly convergent between the fore margin and the first transverse sulcus; obliterated between the sulci; indicated by rather broad, ivory-white, strongly divergent fasciæ in the metazona; margined internally by an indistinct brownish fascia. Lateral lobes with an indefinite blackish spot in the middle and an ivory-white callous stripe below and behind it, reaching the hind margin. Elytra with the mediastinal area extending beyond the middle of the fore margin, not dilated; scapular area reaching almost the apex of the elytra, narrow; externo-median area reaching the apex, narrower than the scapular area; discoidal area extending to the middle of the elytra, rather broad, sparsely, but irregularly reticulated; interulnar area a little narrower than the discoidal, with sparse irregular reticulation; anal area rather broad, with sparse oblique veinlets, radial veins blackened; a row of brownish and hyaline round spots along the middle of the elytra. Fore and middle legs with indefinite greyish and brownish bands. Wings infumate at the apex. Hind femora with two brown spots on the upper side, extending on the outside, where they form very oblique, indefinite, greyish fasciæ reaching the middle line; lower sulcus, as well as the hind tibiæ, muddy yellowish. Pectus and abdomen pale.

♀ (paratype). The coloration more brownish and the design more pronounced than in the male. Frontal ridge with two pairs of black streaks along the marginal carinæ near the clypeus. Metazona of pronotum reddish brown; lateral keels very pale and strongly margined both inside and outside with blackish. Design on the elytra and hind femora of the same pattern as in the male, but more pronounced. Wings less infumate apically.

	♂ (type).	♀ (paratype).
	mm.	mm.
Length of body .....	11·5	16·5
„ head .....	2	2·5
„ pronotum .....	2·5	2·75
„ elytra .....	9·5	12·5
„ hind femora .....	7	8·5

The male type and two female cotypes are from Beaufort

West, Cape Province, 25. iv. and 28. x. 1917; another cotypic male is from Jansenville, Cape Province, 18. ix. 1917.

This interesting insect is very easily recognisable by its habitus, shape of the head and pronotum, and venation of elytra and wings.

5. *Comacris semicarinatus*, Gerst.

There are in the British Museum two specimens from Durban, 1902 (*F. Muir*); the species has not been previously recorded from South Africa.

6. *Æolopus latus*, sp. n.

♀. Of the size of *A. thalassinus*, but more robustly built. Antennæ not reaching the hind margin of the pronotum. Head distinctly thicker than the pronotum in its fore part, a little shorter than the pronotum, moderately reclinate. Face and cheeks smooth, very sparsely and finely punctured. Frontal ridge thick, convex, feebly impressed at the ocellum, sparsely punctured below the latter and densely above it; margins of the ridge very obtuse, gradually divergent from the fastigium downwards, disappearing just below the middle ocellum. Temporal foveolæ only half as long again as broad, narrowed apically, very feebly impressed, rugulose punctured; their lower margin indistinct, interrupted by the punctures. Fastigium of the vertex a little broader than long, almost horizontal, rotundato-pentagonal, with a distinct transverse impression near the base; its margins very slightly raised, obtuse. Pronotum distinctly constricted just behind the fore margin; its disc distinctly convex in the prozona, almost flat and strongly dilated in the metazona; median keel rather thick and low, cut by the transverse sulcus distinctly before its middle; hind angle obtuse, rounded, with its sides straight (not convex, as in *A. thalassinus*); the disc of prozona smooth, that of the metazona smooth in the fore part and in the middle, and densely punctured behind and on the sides; lateral lobes not much higher than long, very feebly narrowed downwards, with the fore margin sinuate, lower margin obtusangulate in the middle, hind margin straight and almost vertical; the fore lower angle obtuse; hind angle straight, scarcely rounded at the apex; the prozona distinctly, and metazona densely punctured. Sternum as in *A. thalassinus*. Meso- and metapleuræ very coarsely rugulose. Elytra rather broad, extending a little beyond the hind knees; their venation as in *A. thalassinus*. Hind femora short and thick, not reaching

the apex of the abdomen, with the apical part scarcely attenuate. Hind tibiae only a little shorter than the hind femora.

General coloration green and brown. Face green. Checks marmorated with blackish; a broad blackish postocular fascia; occiput marmorate with brownish, with two green sublateral fasciae, divergent behind. Pronotum green, with two narrow chocolate streaks on the metazona and blackish-chocolate upper parts of lateral lobes; the middle part of the latter more or less brownish. Elytra with the base brown, with small green spots in the scapular area; a narrow, slightly oblique, transverse fascia in the basal third, followed by a much broader brown fascia; the apical third hyaline, with an indefinite brownish fascia and several spots; wings slightly infumate apically. Hind femora green above, three indistinct dark fasciae in the upper inner area; the externo-median area greyish white, with indefinite brownish streaks along the middle and on the upper and lower keels; the lower sulci pale; the inside red in the basal half, greenish towards the apex, with a large, though interrupted, black spot near the base, and a second smaller, but better-defined transverse fascia behind the middle; the knee with a brownish semilunar spot outwardly and with a deep black spot of the same shape inwardly. Hind tibiae bright red, gradually becoming paler towards the base, with a small black sub-basal spot on the inside and a broader fascia, black on the inside, brownish on the outside, before the middle; spines pale with black apices. Hind tarsi pale, with the first joint somewhat reddish.

♂ (paratype). Differs from the female type by the antennae reaching the hind margin of the pronotum; temporal foveolae more distinctly narrowed anteriorly and more concave; the general coloration is greyish brown, with a brown design, the pattern of which is essentially the same as in the female.

	♀ (type).	♂ (paratype).
	mm.	mm.
Length of body .....	27	18.5
" head .....	4	3
" pronotum . . . .	5	3.75
" elytra .....	22.5	17
" hind femora . . .	14	11

The type and eight paratypes are from Bloemfontein, Orange Free State, 24.ii.-4.iv.1918; five paratypes from Pretoria (*W. L. Distant*); one paratype from Pretoria, 10. iv. 1918; one from Salisbury, Mashonaland, April 1899

(*G. A. K. Marshall*); five paratypes from Orange River Colony (*G. E. H. B. Hamilton*).

The species is rather variable in its coloration, as is the case with most species of *Æolopus*, and I have purposely described as paratype a specimen differing from the type in coloration, but it is easily recognisable by the very broad temporal foveolæ with their lower margin more or less interrupted by puncturation; from *A. thalassinus* it may be also separated by its much thicker head, broader pronotum, and, especially, by the broad hind femora. There is in the Oxford Museum a specimen of this species from Salisbury, Mashonaland (*G. A. K. Marshall*), named by I. Bolivar as *Epacromia contortipes*, Bol., evidently a manuscript name. Some of parotypic specimens from Pretoria have the elytra shorter than in the type and the head thicker; they much recall in their habitus a species of *Edaleus*, but they do not present any definite character by which they can be separated from *A. latus*.

#### ANÆOLOPUS, gen. nov.

Closely related to *Æolopus*. Antennæ rather thick, distinctly flattened throughout, very feebly thickened towards the apex, in both sexes not reaching the hind angle of the pronotum. Head distinctly reclinate. Frontal ridge sulcate throughout or nearly so, with the margins thick, gradually divergent downwards. Fastigium distinctly prominent before the eyes, acutangular in the male, rectangular in the female; slightly sloping and impressed. Temporal foveolæ very strongly reclinate, almost vertical, scarcely visible from above, trapezoidal, strongly narrowed anteriorly, twice as long as the basal width, distinctly impressed, with margins sharp, but not at all margined behind. Pronotum distinctly constricted before the middle; median keel low, but distinct, cut by the transverse sulcus far before the middle; lateral keels in prozona developed, though sometimes very feeble, strongly convergent towards the first transverse sulcus and as strongly divergent behind it; in metazona they are less developed, often smooth and replaced by pale lines, not reaching the hind margin; hind angle straight or even acute, with the apex not at all rounded; lateral lobes as in *Æolopus*. Mesosternal lobes transverse, with a transverse interspace. Metasternal lobes separated in both sexes. Elytra quite like those of *Æolopus*; intercalate vein in the discoidal field thick, apically nearer to the radial vein than to the ulnar; interulnar area with two rows of cells, separated by a rather

regular false vein. Hind femora moderately dilated, with the apex slightly attenuate. Hind tibiae a little shorter than femora; inner lower spur more than twice as long as the lower outer one and about one-third longer than the inner upper spur; both inner spurs thick, gradually bent. The external genitalia as in *Æolopus*.

Genotype: *Gomphocerus* (*Epacromia*) *socius*, Stål.

This new genus is very easily separated from the closely related *Æolopus*, as well as from other genera of the same group, by the almost vertical position of the temporal foveolæ, which are, besides, not marginated behind; the length of the inner tibial spurs is also very characteristic.

### 7. *Anæolopus socius*, Stål. (Fig. 1.)

1860. *Gomphocerus* (*Epacromia*) *socius*, Stål, *Eugenies Resa*, Orth. p. 342. no. 100.

1870. *Stenobothrus minusculus*, Walker, *Cat. Derm. Salt. B.M.* p. 763. no. 61.

1870. *Epacromia* (?) *prasina*, Walker, *l. c.* p. 770. no. 9.

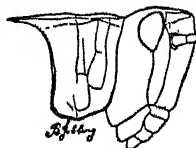
1910. *Chirista* (?) *socia*, Kirby, *Syn. Cat. Orth.* iii. p. 142. no. 1.

1910. *Chortoicetes minusculus*, Kirby, *l. c.* p. 193. no. 7.

1910. *Chortoicetes prasina*, Kirby, *l. c.* p. 193. no. 8.

The species is extremely variable not only in its coloration, but in some morphological characters as well. Thus, the hind angle of the pronotum may be either sharp or straight; the lateral keels are sometimes rather well developed even in the metazona, and sometimes scarcely perceptible in the prozona; there are often two irregular longitudinal keels parallel to the median keel (mentioned by Stål, *l. c.* p. 313),

Fig. 1.



*Anæolopus socius* (Stål).

but in many cases there is no trace of those keels; elytra are now shorter than hind femora, now distinctly longer and more narrow. As for coloration, *St. prasinus*, Walk., and *Ep. minuscula*, Walk., represent two extreme forms, which are connected by an uninterrupted series of intermediate colour-forms, and *Gomphocerus socius*, St., belongs to one



of these. These variations in the morphology and coloration do not, however, permit of the establishment even of definite geographical forms, and much less can they be separated into distinct species.

I have before me a very long series from the following localities:—Bloemfontein, Orange Free State; Pretoria; Deelfontein; Namaqualand; Smithsfield district; Albert district.

The synonymy of Stål's species with those of Walker is beyond any doubt.

### 8. *Paraparga brevipennis*, sp. n.

♂. Body slender, strongly compressed laterally. Antennæ reaching the hind margin of the pronotum; their first and second joints cylindrical; the third to eighth joints strongly flattened, triangular; third joint the widest and longer than any other except the sixth, which is as long as the third; the fourth joint shorter than half the first and about twice as broad as long; the fifth joint about twice as long as the fourth, slightly narrower than the latter, and a little longer than broad; the sixth joint much longer than broad, a little longer and distinctly narrower than the fifth; the seventh joint much narrower than the sixth and distinctly shorter than half the latter, broader than long; the eighth as broad as the seventh, but distinctly longer; all the remaining joints subrotundate, only slightly flattened, strongly punctured throughout; the apical joint conical. Face strongly reclinate, rugulosely ridged; frontal ridge between the fastigium and the median ocellum subparallel (only slightly narrowed in the middle of that distance) and gradually widening below the ocellum, sulcate throughout, with a few longitudinal rugosities in its lower part. Fastigium of the vertex, as seen in profile, distinctly shorter than the eye, though longer than its half; when seen from above it is much longer than broad, with the apex regularly rounded and sides parallel; its surface is slightly impressed, with irregular longitudinal rugosities and a well-developed median keel extending from its apex to the pronotum, though lower in the hind part of the occiput. The occiput and the cheeks longitudinally rugulose. Pronotum with the longitudinal ridges on the disc more dense and regular in the metazona; its median keel rather thick, well developed throughout, cut by the transverse sulcus far behind the middle; the lateral keels as thick as the median, very feebly concave; the fore

margin of the disc rounded ; its hind margin very obtusely rounded ; lateral lobes distinctly longer than high, with irregular longitudinal rugosities throughout, except at the upper third, which is rather smooth, not shining ; the lower margin is very obtusely angulate in the middle ; the fore angle is obtuse, not rounded ; the hind angle a little less than  $90^{\circ}$ , slightly attenuate, very feebly rounded ; the hind margin distinctly concave and uneven. Prosternum slightly convex. Mesosternum and metasternum sparsely but coarsely punctured ; mesosternal lobes slightly broader than long, strongly rounded at the interior margins ; their interspace a little longer than broad, widened anteriorly and posteriorly ; metasternal lobes distinctly separated from each other. Elytra reaching just a little beyond the middle of the abdomen, with the apex pointed. Hind femora extending well beyond the apex of the abdomen, narrow ; the outer upper keel slightly prolonged, the inner upper one more so ; the knee-lobes short, narrow, triangular, rounded apically. Abdomen coarsely punctured throughout, especially on the sides and towards the end. Supra-anal plate obtusely triangular, longer than broad, with two parallel obtuse carinae along the middle, slightly convergent behind. Cerci straight, round, about as long as the supra-anal plate. Subgenital plate very coarsely punctured, about twice as long as the basal width, slightly attenuate, with the apex obtuse.

General coloration blackish brown. Head and antennae black ; the apical half of the latter brown ; the cheeks with a whitish stripe running backwards across the lower third of the pronotal lobes and the pleurae. Pronotum brown. Elytra of a lighter shade, with a narrow whitish callous stripe in the scapular field ; the mediastinal and the discoidal areas darker than the rest of the elytra. Hind femora brown, darker below than on the upper side, gradually darkened towards the knees, which are almost black. Wings orange-yellow, with the apex infumate. Hind tibiae blackish. Pectus and abdomen brownish yellow beneath.

♀ (paratype). Antennae shorter than in the male, with the outer angles of the joints 3-8 very feebly produced. Mesosternal interspace about as long as broad ; metasternal lobes widely separated. General coloration of a lighter shade than in the male ; the lateral fascia on the head, pronotum, and pleurae buff, instead of white ; the scapular callous fascia of the elytra dirty yellow. Hind tibia dark grey.

	♂ (type).	♀ (paratype).
	mm.	mm.
Length of body . . . . .	19	26.5
" head . . . . .	4	5
" pronotum . . . . .	4	5.5
" elytra . . . . .	8.5	11
" hind femora . . . .	11	14

Described from one male and two females from Tzaneen, Transvaal, 10. xii. 1918. The second paratypic female is almost as dark-coloured above as the male, but without a distinct lateral fascia on the head, pronotum, and pleuræ; the lateral lobes of the pronotum are uniformly buff-coloured; the elytra are also uniformly coloured, without scapular stripe, the scapular area being callous but unicolorous with the rest of the elytra. The coloration in this species seems to be rather inconstant, but it is very well defined by its morphological characters, and very easily separated from the only known species of the genus, *Paraparga strigosa*, Bol., by its shortened elytra.

LXIII.—*An interesting new Grasshopper from Mount Everest.* By B. P. UVAROV, F.E.S.

THOUGH the Mount Everest Expedition of 1921 brought home only two specimens of grasshoppers, one of them proved to be extremely interesting and representing a new genus, which is described below. Another specimen is a *Bryodema* sp. which cannot at present be named specifically, as it is a female, while the species nearest to it—*Bryodema holdereri*, Krauss,—described from Kuku-Nor in Mongolia, is known in the male sex only.

HYPERNEPHIA, gen. nov.

♀. Superficially not unlike the genus *Conophyma*, but differing in many characters.

Antennæ 17-jointed, distinctly longer than the head and pronotum taken together, in the apical half compressed and very slightly dilated. Head thick. Frontal ridge in profile feebly reclinate, convex near the clypeus and practically straight in the rest; seen from the front it is broad, flat, with the margins obtuse, not at all raised, subparallel, suddenly and completely convergent at the fastigium, obliterate near

the clypeus. Lateral facial keels obtuse, in the upper part obliterate. Fastigium of the vertex somewhat sloping, forming a rounded angle with the frontal ridge, slightly impressed, with the margins scarcely raised, acutangularly convergent in front. Temporal foveolæ placed obliquely, elongate, not reaching the apex of the fastigium. All ocelli undeveloped. Eyes comparatively small, very broad-oval; with the fore lower angle acute; their height much less than the subocular distance; the distance between the eyes about half as broad again as the frontal ridge below antennæ. Pronotum short and thick, subcylindrical, its disc feebly tectiform; the median keel very low, linear, interrupted by the third sulcus only, while two other sulci are undeveloped; lateral keels scarcely perceptible, irregular, somewhat divergent behind; hind margin obtusangularly excised, exposing the short mesonotum. Prosternum only slightly swollen, but not armed. Mesosternum very broad, with the interspace transverse. Elytra rudimentary, very short and narrow. No abdominal tympanum. Hind femora comparatively narrow, gradually narrowed towards the apex, without a distinct filiform part. Hind tibiæ with seven to eight outer spines, without an apical one, and with nine or ten inner spines including the apical one. Valvæ of the ovipositor short and thick, lower ones without teeth.

Genotype: *Hypernephia everesti*, sp. n.

*Hypernephia everesti*, sp. n.

♀. Dark brown, indistinctly marmorated with blackish, dull, but practically smooth. Face somewhat shining, though rugulose; frontal ridge flat, sparsely but rather coarsely punctured, with an indistinct impression at the place of the median ocellum, slightly narrowed below it, widened and disappearing farther downwards. Fastigium of the vertex somewhat longer than broad, pentagonal, with the apical angle acute; its hind lateral margins short, not reaching the middle of the eyes. Disc of the pronotum only a little longer than it is broad behind; mesozona twice as long as metazona; lateral keels very feeble, irregular, parallel in the front third, then slightly divergent towards the typical sulcus, which is very feeble, and more divergent, but broken and very irregular in metazona. Lateral lobes of the pronotum higher than long; their lower margin very widely rounded just behind the middle, with its fore half ascending and forming a widely rounded obtuse angle with the fore margin; hind angle about 90°, rounded; their surface uneven, convex

in metazona, impressed in the lower third of the prozona, with some short and low longitudinal carinulae between the transverse sulci which are scarcely developed but still perceptible. Elytra extending a little beyond the middle of the metanotum, four or five times as long as at the base, broad, narrowed towards the rounded apex. Abdomen with a low, linear, median keel. Hind femora probably olivaceous in life; hind tibiae pale brown (reddish in life?).

Length of body 14 mm.; pronotum 3 mm.; elytra 1.5 mm.; hind femur 8.5 mm.

The type is labelled "Mt. Everest Exped. Up to 18,500 ft., July, 1921." It is in the British Museum collection.

The exact systematic position of this curious insect is not yet clear. It evidently has nothing to do with *Conophyma*, which it resembles so closely at first sight, because it has no outer apical spine of the hind tibiae, and belongs therefore to another division. The absence of the prosternal spine seems even to indicate that it is a member of either *Acridinæ* (= *Truxalinæ*) or *Locustinæ* (= *Ædipodinæ*), but I am more inclined to include it in *Catantopinæ* judging by all other characters, though a definite solution may be arrived at only after the male sex is described.

It is a great pity that only one specimen has been brought by the Expedition, though the insects are undoubtedly not uncommon on the Alpine pastures. It is worth drawing the attention of all future collectors on high altitudes in Central Asia that their Orthopterous fauna is wholly unexplored, and collecting of small, wingless, larvæ-like grasshoppers is especially desirable, as they are usually strictly localized, and their extensive study may throw some light on the origin and history of the Palæarctic fauna.

#### LXIV.—On some *Fijian* Psyllidæ (*Homoptera*).

By F. LAING, M.A., B.Sc.

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THROUGH the kindness of Dr. G. A. K. Marshall, Director of the Imperial Bureau of Entomology, I have been able to examine a collection of Psyllidæ from Fiji. Three undescribed species appear to be present, and descriptions of them are given herewith.

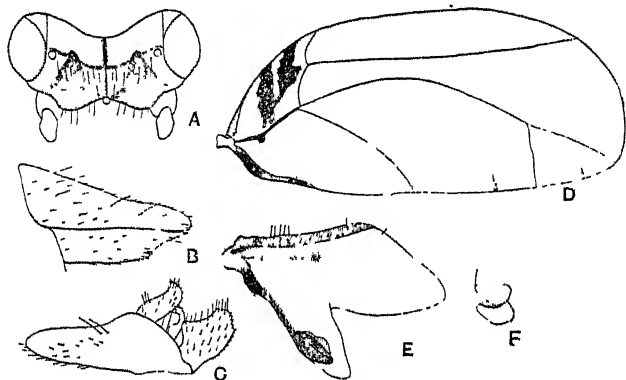
*Paurocephala psylloptera*, Crawl.

This widely distributed species has not hitherto been recorded from Fiji, though its variety *setifera* has. Greenwood has recently taken the type-species plentifully on *Ficus* in the mountains of Lautoka.

*Leptynoptera didactyla*, sp. n. (Fig. 1.)

General colour canary-yellow; black fascia at the tips of segment 4 and tip of the antennæ and midway between, remainder of the antennæ pale; narrow, sordid white bands forming a U on either side of the median suture of the vertex and another on the lateral margin; two white lateral

Fig. 1.

*Leptynoptera didactyla*.

A, head; B, ♀ genitalia; C, ♂ genitalia; D, E, front and hind wings; F, first two segments of antenna.

spots on the pronotum, two white, narrow, parallel-curved bands on either side of the dorsum, ending before they reach the middle; mesonotum with three parallel, straight, narrow, median streaks, a curved one medio-laterally, and another marginally, all vague or obsolete anteriorly; wings hyaline with two dark brown fascia confluent posteriorly in the anterior basal cell; abdomen with most of the segments bordered with dark brown.

Head not quite so broad as the thorax, vertex with a fovea on either side of the median suture, broad anteriorly, narrowing backwards to end level with the lateral ocelli,

elevated over the base of the antennæ, a few longish pale hairs. Antennæ short, about twice the breadth of the vertex, basal two segments cup-shaped, slightly porrected on one side. Dorsulum with a faint median carina. Tegmina about twice as long as broad; hind wings very small, about one-fifth the length of the tegmina, partially bilobed, the costal and anal margins chitinized. Genitalia, female with anal segment about two-thirds the length of the abdomen, dorsal valve scarcely longer than the ventral, bluntly rounded, ventral valve black-pointed, angled ventrad, with a bunch of strong spines in the angle; male with the forceps about two-thirds the length of the anal valve, the last tergite produced backwards into a strong subconical process.

Length 2·3 mm.; length of tegmen 3 mm.

Fiji, Cuvu, on (*alophyllum inophyllum*, L. (*W. Greenwood*)).

The narrow white bands should distinguish this species from *L. sulphurea*, Crawf., the only other member of the genus.

*Nesiope ornata*, Kirk.

Fiji, Cuvu, feeding on the underside of the leaves of *Heritiera littoralis*, Dry. (*W. Greenwood*).

I have a considerable series of this species, and the variation in the colour on the notum is greater than that indicated in the original description, which was drawn up from one specimen. The white median line is by no means distinctly marked and in many specimens is completely obliterated.

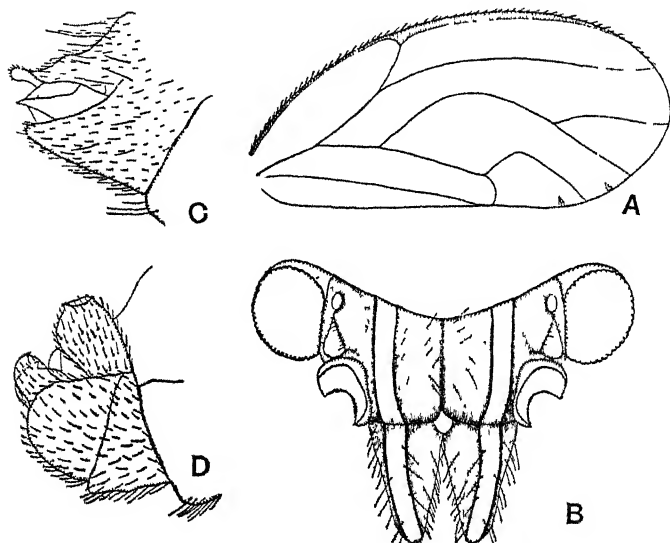
*Epipsylla bilineata*, sp. n. (Fig. 2.)

Apple-green, with two broad, parallel, silvery bands narrowly bordered with very dark brown to purple, running from the tips of the genal cones through the vertex and thorax and converging in an oval spot on the postscutellum; a semicircular patch between the posterior ocelli and the base of the antennæ. Between the silvery bands on the dorsulum is a brownish patch, and on either side on the mesonotum are vague brownish areas. Antennæ with the first two segments brown, III. brown with black tip, IV., V., VI. black with brown bases, remaining segments black.

Head as broad as the thorax; vertex rather flat in the middle, strongly elevated in the postocellar areas, with a few black hairs; a row of very short black hairs on the

margin of the semicircular silvery patch and ventrally to the ocelli. Antennæ long and slender, longer than the whole insect. Thorax arched. Tegmina hyaline, a little more than twice as long as broad. Genitalia, male with anal valve obovate, forceps about two-thirds the length of the anal valve, black at the tip, pubescent, an inner, shorter, accessory pair present; female with dorsal valve if anything slightly longer than the ventral, the whole very short.

Fig. 2.

*Epipsylla bilineata*.

A, tegmen; B, head; C, ♀ genitalia; D, ♂ genitalia.

Length 3 mm.; length to the tip of the closed tegmina 5 mm.

Fiji, Cuvu (*W. Greenwood* and *R. Veitch*).

This species may be distinguished from *E. pulchra*, Crawf., its nearest ally, by the green coloration and the absence of the white line on the genal cones below the antennæ.

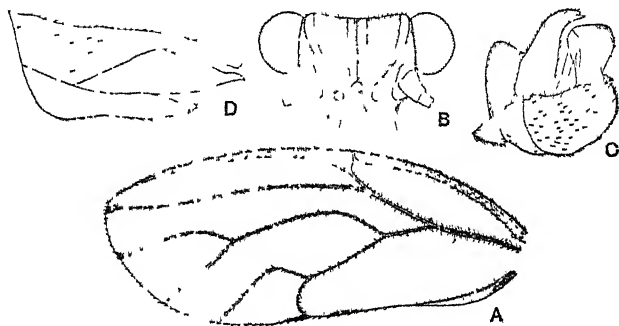
*Arytaina quadrioculata*, sp. n. (Fig. 3.)

Dark brown, in the inner angles of the genal cones and in the apical angles of the vertex, above the median ocellus, circular pale spots; vertex with on either side of the median suture, a sordid white band reaching from the posterior



margin halfway forward, another curved one running from the lateral ocellus around the margin; on the posterior border midway between these two bands a white spot. Postero-lateral ocelli black. Pronotum on posterior margin with short white perpendicular bands, the median pair confluent anteriorly; mesonotum with a median whitish band not quite reaching the front border and marginally vaguely white; dorsulum obscurely testaceous; scutellum with white spots, one anterior, median, two posteriorly, and a lateral band. Tegmina infuscated, more deeply in a wide marginal band running from the apex to beyond the second discoidal; nervures pilose.

FIG. 3.

*Arytaina quadrioculata.*

A, tegmen; B, head; C, ♂ genitalia; D, ♀ genitalia.

Head not so wide as the thorax, hind margin of vertex slightly concave, with numerous hairs. Genal cones short, broad, rounded at apex, pilose. Antennæ very long, longer than the body. Mesonotum and dorsulum pubescent. Tegmina slightly more than twice as long as broad. Genitalia, male with anal valve broad at base, tapering towards the tip, emarginate; forceps obovate-truncate, on the outer upper angle numerous short, strong, black spines; female with the genital segment fully as long as the rest of the abdomen, dorsal valve longer than ventral, truncate at tip, ventral valve with a strong spine at tip.

Total length 3.1 mm.; length to tip of folded tegmina 4 mm.

Fiji, Labasa (*R. Veitch*).

The markings are not always conspicuous; the circular pale spots on the head may be partially obscured, and one male has the white bands almost obliterated.

LXV.—*Coleoptera of the Mt. Everest Expedition, 1921.*

By K. G. BLAIR, B.Sc., F.E.S.

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THE collection of *Colcoptera* obtained by the Expedition during the summer of 1921 is unfortunately very meagre, consisting only of twenty-one specimens belonging to eight species, and divided among seven families. Most of them were obtained in July at the camp above Rhumbu Glacier, north-west of Everest, at an elevation of 18,500 feet. In spite of its meagreness, the collection is interesting in containing three species that are here described as new to science, as well as two others that are probably new, but both are represented by single specimens, too incomplete to warrant description. Several of the species here recorded were obtained in greater number by the members of the Tibet Expedition of 1904 at somewhat lower altitudes.

It is greatly to be hoped that more sustained efforts will be made during the coming season to secure a collection more representative of this faunistically interesting region. Opportunities of collecting in regions so difficult of access are few, and when they do occur it is a thousand pities if they are not seized to the fullest.

The following is a list of the species obtained, all of which have now been placed in the National Collection at South Kensington.

Fam. *Silphidæ*.

*Necrophorus semenowi*, Reitter, Ent. Nachr. xvi. 1887, p. 216.

One specimen.

Described from Tibet, the species was not previously represented in the British Museum.

Fam. *Elateridæ*.

*Lacon brunnipennis*, Candèze, Mon. Elat. i. 1857, p. 133.

One specimen.

Also from Tangu, Teesta Valley, Sikkim, by Tibet Expedition, 1903-04.

Fam. *Rutelidæ*.

*Callistopopillia iris*, Candèze, Col. Hefte, v. 1869, p. 43.

One specimen.

Represented in the British Museum by numerous speci-

mens from Kurscong, Mungphu, and Darjeeling, and from Yatong, Thibet.

Fam. Tenebrionidæ.

*Blaps thibetana*, sp. n.

Stout, moderately convex above; antennæ short, not reaching base of thorax, joints 4-7 not twice as long as wide. Thorax transverse, convex, sides rounded, distinctly narrowed to base, disc moderately densely and strongly punctate. Elytra broad, moderately convex, sharply declivous behind, not produced at apex, lateral margin visible from above nearly to middle; disc finely rugose, with numerous small backwardly directed granules which are subseriatly arranged, with numerous faintly indicated impressed striae. Legs not very long, femora feebly clavate, anterior and intermediate tibiæ slightly curved, the former not emarginate at base; first joint of posterior tarsi longer than the two following together, asymmetrical at apex, *i. e.* the inner side longer than the outer, the second and third joints elongate, triangular, but not twice as long as wide.

♂ with hair-pad between first and second abdominal segments, the former with transverse folds immediately behind coxæ, but no tubercle and no caudal prolongation of elytra; shape slightly more slender than that of ♀.

Length 16 mm.

Two ♂♂ and three ♀♀ collected by present expedition; numerous examples of both sexes from Gyangtse, 13,000 feet, June 1904.

The species would appear to fall into Abth. ii. gr. 3 of Seidlitz's table, and to resemble *B. rugulipennis*, Fairm., in the absence of a caudal prolongation to the elytra, but from this it differs in the shorter antennæ and tarsi. In general aspect it is, perhaps, most like *B. rugosa*, Gebl., but has the thorax more transverse, more convex, and more narrowed behind, the elytra very much more finely, and differently sculptured with about eighteen faint striae more or less clearly indicated.

*Blaps apicecostata*, sp. n.

Elongate, narrow, subnitid, dorsum depressed; antennæ reaching base of thorax (♀) or extending beyond it (♂), joints 4-7 twice as long as wide, 8-10 moniliform; thorax not very strongly convex, a little wider than long, the disc finely and densely but rather irregularly punctate; elytra depressed on the back, the lateral carina visible from above in its

anterior half, being concealed in its posterior half by a blunt costa, which projects above it and meets its fellow at the apex. On the disc are faint indications of striæ with feebly convex intervals; these become a little more raised behind, especially the third, which unites with the marginal costa (7th interval) a little before the apex. The apex in both sexes projects a little beyond the last ventral segment, but is not produced into a caudal process. Prosternal process rounded, declivous behind coxæ; legs moderately slender, femora feebly clavate, first joint of posterior tarsi symmetrical, as long as the two following together.

♂ without abdominal fascicle, longer and narrower than ♀.

Size, ♂  $21 \times 7.5$  mm., ♀  $19 \times 8$  mm.

Two ♀♀ collected by the present Expedition, two ♂♂ and two ♀♀ by the Thibet Expedition, Tungu, Sikkim, July 1903 (1 ♀), and Gyangtse, 13,000 feet, June 1904.

In the synopsis given by Seidlitz (Krichs. Ins. Deutsch. Abt. i. Bd. v. 1898), this species would come in Abth. ii. gr. 14, next to *B. gentilis*, Fairm. From this it differs in its larger size, narrower form, stouter legs, more distinctly granulate elytra, and the very characteristic costæ visible on the apical declivity.

In this last particular it is approached by *B. indica*, Hope, from Nepal, but the latter is much smaller (1.4 mm.), has the thorax much narrower than the elytra, which are strongly rounded laterally.

### *Blaps* sp.

A single ♀, possibly only a form of the last.

Fam. Cistelidæ. (ALLECULIDÆ.)

*Cteniopinus semicoccineus*, sp. n.

Dull black, with the elytra and abdomen scarlet. Head elongate, densely punctate above; antennæ slender, in ♂ reaching middle of elytra, in ♀ a little shorter, second joint not longer than wide, the rest elongate, the eleventh suddenly constricted so that the apical third is much narrower than the rest. Last joint of maxillary palpi elongate, a little longer and wider than the preceding. Thorax nearly flat, campanulate, widest at base, sides sharply carinate in basal half, but obtuse or rounded towards apex, disc densely punctate. Elytra subparallel, striæ sharply punctate, but not much impressed, the first, third, fifth, etc. intervals narrower than the rest, the broad intervals containing small

irregular depressions defined by circles of punctures; these circles become very irregular and confluent with the striae, so that on the central portion of the wing striae and circles become hopelessly confused. Prosternal process raised above level of coxae, but not projecting behind them; abdomen scarlet, with the posterior edges of the third and fourth segments black, posterior coxae rounded behind, slightly protruding over first abdominal segment; the latter fits closely up against it, but is of a softish texture, and does not form a sharp marginal rim to the coxal cavity; the intercoxal process also is depressed between the coxae, not flush with the metasternum; intermediate and posterior tibiae arcuate.

♂ with sixth abdominal segment deeply excavate and emarginate, the anterior and intermediate tarsi elongate, first joint scarcely longer than second; in the ♀ it is nearly twice as long.

Length 13–15 mm.

One ♂ and two ♀.

The general appearance of this insect is very much that of a *Cistelmorpha*, and the confused elytral striae recall those of *C. haematica*, Redt., but the formation of the posterior coxae and the articulation of metathorax and abdomen preclude its being placed in that genus. A closely allied species, but with dark blue-black elytra with very much deeper impressions giving them an irregular crumbled appearance, with similar bright red abdomen with black transverse bands between the third and fourth, and fourth and fifth segments, bears the name *Lechinius catenulatus* (Bates MS.) in the British Museum Collection. It is from Sikkim.

#### Fam Meloidæ.

*Mylabris (Pseudabris?) przewalskyi*, Dokhtouroff, Horæ Soc. Ent. Ross. xxi. 1887, p. 341; xxiv. 1890, pl. i. figs. 11, 12.

Six specimens by the present Expedition; numerous examples from Gyangtse, 13,000 feet, June 1904, Lhasa, August and September 1904, and Khamba Jong, Sikkim, (15,000–16,000 feet), July 1903, by the Thibet Expedition, 1903–04.

This species is labelled by Dr. Creighton Wellman "*Pseudabris tigridera*, Fairm. (?)," but the identity appears to me doubtful. *Pseudabris* is described as being wingless with short metasternum and slightly dehiscent elytra, while the antennæ are stated to be not thicker towards the apex. The abdomen is also said to project considerably beyond the

elytra, which is seldom the case in *M. przewalskyi*. The description of the form of the head, the sculpture, and coloration of the elytra agree well with this species, but the characters cited above indicate a different, though perhaps closely allied, genus.

Fam. Curculionidæ.

*Leptomias* sp.

Allied to *L. waltoni*, Marshall, from Sikkim; the single specimen is incomplete and insufficiently well preserved for description.

LXVI.—*The Mordellidæ of the Fiji Islands.*

By K. G. BLAIR, B.Sc., F.E.S.

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A SINGLE species of this interesting family appears to have been hitherto recorded from the Fiji Islands, viz., *Mordellistena dodoneæ*, Montr., originally described from New Caledonia. A small collection sent from time to time to the Imperial Bureau of Entomology for identification contains not less than nine species, including that mentioned. Of the others one species is identified with some doubt as *Mordella 10-guttata*, F.; the rest appear to be new.

Only two genera are represented, *Mordella* and *Mordellistena*. The species of the latter are very similar to the small species of *Mordella*, but are distinguished by the presence on the outer face of the posterior tibiæ and first three tarsal joints of series of stiff bristles forming comb-like ridges; these extend from the posterior edge of the tibiæ and run obliquely upwards but usually not right across the external face of the tibia.

*Key to the Species of Mordella.*

1. Large species (10 mm. or over), black, clothed with black pubescence varied with numerous white spots ..... 2.
- Small species (less than 5 mm.), black or fuscous, clothed with black pubescence, varied with silvery-grey spots or bands ..... 3.
2. Elytra with scutellar white spots; four confluent white spots along base of thorax .... *10-guttata*, F.

- Elytra without scutellar spots; two white spots at base of thorax . . . . . *vitiensis*, sp. n.
3. Thorax, basal half of elytra and legs obscurely reddish, antennæ and abdomen paler; elytra each with three silvery spots . . . . . *nigroterminata*, sp. n.
- Black, except labrum, palpi, base of antennæ, anterior femora, and posterior tibial spurs, which are testaceous; elytra with two oblique silvery fasciæ . . . . . *veitchi*, sp. n.

*Mordella decemguttata*, Fabr.

Fabricius, Syst. Eleuth. ii. 1801, p. 123; Montrouzier, Ann. Soc. Agr. Lyon, vii. 1, 1855, p. 34.

*Mordella plurinotata*, Blanchard, Voy. Pôle Sud, iv. 1853, p. 190, pl. xii. fig. 16.

Two specimens—1 (*F. P. Jepson*), 1909, "on orange-tree"; 1 (*W. Greenwood*), 1. v. 1921. Mts. Lautoka.

This identification and synonymy are perhaps a little doubtful. Fabricius originally described the species from Java, but this was probably in error; at least I have seen no specimen answering to the description from anywhere in that region. Montrouzier later more fully described what he considered to be the same species from Woodlark Id. (near the S.E. end of New Guinea). Except that he describes the spots as yellow (and in some allied species they are sometimes yellow), his description quite fits the specimens from Fiji. Previously to this Blanchard had described and figured *M. plurinotata* from Ceram, and with this also the Fiji examples agree well.

The Australian *M. 14-maculata*, Macleay (?=*M. vitticollis*, Lea), is very closely allied, but the thorax of the Fiji species is more quadrangular, more strongly transverse, and differently marked, the sides lacking the white border and the spots, except the basal row, not confluent or connected by lines.

*Mordella vitiensis*, sp. n.

Large, black, clothed with black pubescence, variegated with white spots and lines which are arranged as follows:—head, a narrow white margin on each side of base; thorax, four white spots in a slightly arcuate line a little before the middle, the outer pair near the sides, a round spot on each side of base opposite the middle of the base of each elytron; elytra, a round spot (No. 1) on each directly behind the basal thoracic spot nearly as far from it as the two latter are from one another, a minute spot (No. 2) a little behind this

and halfway between it on the lateral margin, No. 3 rather further behind 2 than 2 is behind the basal thoracic, and very much nearer the suture, No. 4, small, a little behind 3 and in direct line with the basal thoracic and No. 1, No. 5, towards apex, a little further from the suture than No. 3; an elongate spot on each side of base of pygidium; on the under side, one on the metathoracic epimeron, one in the middle of the lateral border of the posterior coxa, and one in the antero-lateral angle of each of the first three ventral segments. Style long, straight, acutely pointed at apex.

Length  $12\frac{1}{2}$  mm., including style; 8 mm. to tip of elytra.

A single specimen, Labasa, xi. 14 (*R. Veitch*).

Distinct among all these large, white-spotted forms in the lack of scutellar spots on the elytra, in conjunction with the lack of extensive white markings along the base of the thorax. Its nearest ally is probably *M. 16-guttata*, Montr., from New Caledonia, from which it differs in the number and distribution of the spots. It also resembles *M. funerea*, Pasc., from New Zealand, though in this the white spots are yet fewer. The position of the white spot on the posterior coxæ is unusual, and is similar in *M. 16-guttata*; in most species it is situated in the antero-lateral angle. Of the Australian species *M. chrysophora*, Lea, is probably its closest ally.

### *Mordella nigroterminata*, sp. n.

Small, stout, obscurely rufous above, with the head and apex of elytra black, antennæ and abdomen paler, rufopulvous. Head, except a large space between the eyes, clothed with silvery-grey pubescence; thorax with a narrow line along the anterior margin, a small spot near each anterior angle, and a larger spot on each side of the middle of the base of the same colour; scutellum strongly transverse but not emarginate at apex, clothed with silvery-grey pubescence; elytra with an elongate oblique spot behind each shoulder, an oval spot just before the middle and not far from the suture, and a squarish spot halfway between this and the apex silvery grey; the derm beyond this spot is distinctly blacker than that of the greater part of the elytron. Pygidium acute, almost twice as long as hypopygium.

Length 4 mm. (style included).

1 ex., Nausori, Oct. 1920 (*R. Veitch*).

In its short stout build this little species bears some



resemblance to a *Tomoxia*, but the scutellum, though transverse, is bluntly rounded at the apex instead of being emarginate. Other species of similar form, but different coloration, are *M. graphiptera*, Champ., and some undescribed species from the Malay Archipelago.

*Mordella veitchi*, sp. n.

Small, slender, black, with the exception of the labrum, palpi, base of antennæ, anterior legs, and posterior tibial spurs, which are testaceous; pubescence black variegated with silvery-grey which is distributed as follows:—head, almost entirely; thorax, anterior and posterior margins, a pair of submedian lines on disc, slightly oblique, and a spot on each side between these and the anterior angle; scutellum; elytra, a humeral spot on each, an oblique spot behind it extending nearly to the suture, an oblique spot near the outer margin just behind the middle which is confluent with a common sutural spot at about two-thirds of their length. Antennæ slender, 2nd joint larger than 3rd, 4th to 10th serrate within but longer than wide. Intermediate tarsi a little longer than the tibiæ, first joint longer than the rest together. Spurs of posterior tibiæ unequal, the inner three times as long as the outer. Style slender, feebly bent downwards about middle, twice as long as hypopygium.

Length  $3\frac{1}{4}$  mm. (style included).

2 ex., Labasa, Dec. 1921 (*R. Veitch*).

A small slender species with the general appearance of a *Mordellistena*, but with no oblique comb-ridges on the posterior tibiæ and tarsi. The spots and bands of pale pubescence on the elytra form two V-shaped marks, the anterior originating from the shoulders and open on the suture, the second situated a little behind the middle.

MORDELLISTENA.

Small species differing from *Mordella* in the presence of oblique comb-like ridges on the outer face of the posterior tibiæ and of the first two or three tarsal joints.

*Key to the Species.*

1. Colour black with more or less extensive yellow markings..... 2.

- Colour entirely flavo- or rufo-testaceous (except eyes and the comb-ridges of the posterior tibiae) ..... 3.
2. Head yellow; elytra with the base and two large round spots on each yellow; ridge formula 3:2.2.0 ..... *xanthocephala*, sp. n.
- Head and body black, elytra with pale markings forming three rather irregular transverse bands; formula 3:3.2.1 ..... *greenwoodi*, sp. n.
3. Anal style about twice as long as hypopygium, tapering ..... 4.
- Anal style much longer, slender, sinuate; ridge formula 3:3.2.2; inner spur nearly as long as 1st tarsal joint ..... *gracilicauda*, sp. n.
4. Formula 5:4.2.2; spur  $\frac{1}{2}$  as long as 1st tarsal joint ..... *dodoneæ*, Montr.
- Formula 4:3.2.2; spur  $\frac{2}{3}$  as long as 1st tarsal joint ..... *consimilis*, sp. n.

*Mordellistena xanthocephala*, sp. n.

Elongate, narrow, thinly pubescent; black above, with the head, scutellum, base of elytra and two round spots on each, one before and one after the middle, pale flavous; underside and legs also black with flavous bands. Head emarginate behind; prothorax as long as wide, its greatest width across the base, anterior margin prominent, anterior angles obtusely rounded, posterior angles rectangular, base straight at sides, strongly produced in middle; scutellum minute; elytra elongate, parallel; clothed with rather sparse fuscous pubescence, except on the pale areas, where it becomes silvery. Pygidium long and slender, more than four times as long as hypopygium, bent in middle and feebly sinuate towards apex, fuscous above except at base, flavous beneath. Anterior legs, basal half of intermediate tibiae, and base of posterior tibiae and tarsal joints flavous, posterior tibiae with a short subapical oblique ridge, and two very long ones about middle, extending right across the outer face of tibiae; spurs unequal, flavous.

Length (with style) 3 mm., (without) 2 mm.

3 ex., Labasa, xii. 21 (*R. Veitch*); 1 ex., Mts. Lautoka, xii. 21 (*W. Greenwood*).

This pretty little species cannot well be confused with any other, owing to its striking pattern.

*Mordellistena greenwoodi*, sp. n.

Black, with parts of the elytra, the antennæ, and anterior

legs rufo-fulvous. Head slightly emarginate behind, covered with ashy-grey pubescence; prothorax as long as wide, with variegated black and ashy-grey pubescence, the black forming a large patch in each of the angles and two median pairs of dart-like marks, with point directed backwards, the anterior pair before the middle smaller than the posterior pair; elytra fulvous with suture narrowly and apex broadly black, a large black patch behind the scutellum and two lateral patches on each nearly meeting the sutural streak also black; the pubescence on the black parts is black, that on the fulvous parts mostly silvery grey, but in parts, *e. g.* a streak from the anterior lateral dark patch to the base, and also between the posterior lateral dark patch and the suture, is also black. Style slender, fuscous, about three times as long as hypopygium. Posterior tibiæ fulvous at base, with two short comb-ridges near apex, and a third long strongly defined ridge running from the middle of the posterior edge across the outer face almost to the base; the tarsal ridges 3.2.1, are very short and indistinct.

Length 2 mm. without ( $2\frac{1}{2}$  mm. with) style.

1 ex., Loliti, 18. ix. 21 (*W. Greenwood*).

A very distinct little species, the pattern of the thorax is very characteristic, and the incomplete coincidence between the colour-pattern of the derm of the elytra and that of the pubescence is very striking.

*Mordellistena dodoneæ*, Montrouzier.

Montrouzier, Ann. Soc. Ent. France, (3) viii. 1860, p. 306 (*Mordella*); Fairmaire, *op. cit.* (5) i. 1881, p. 286 (*Mordella*).

Described originally from New Caledonia, this species was subsequently recorded by Fairmaire from the Fiji Islands. A series of eleven rufo-testaceous specimens from the Fijis now before me appears to be divisible into three very similar species, the largest of which appears to be identical with a series from New Caledonia, with which I identify *Mordella dodoneæ*. The posterior tibiæ, however, and tarsal joints, bear very distinct comb-ridges, so that if this identification is correct the species must be referred to *Mordellistena*.

On the tibiæ are four short ridges, sometimes with traces of a fifth, uppermost, ridge, all roughly parallel with the apex, none of them reaching halfway across the outer face of the tibiæ; the tarsal ridges are 4.2.2; the tibial spurs are unequal, the inner one about twice as long as the outer

and about half as long as the first tarsal joint. The antennæ are slender, joints 2 and 3 elongate, subequal, joints 4-11 nearly twice as long and much thicker.

Length 4 mm. with ( $3\frac{1}{4}$  mm. without) style.

2 ex. Natova, ix. 18 (*R. Veitch*); 2 ex. Labasa, xii. 21 (*R. Veitch*, no. 388); 1 ex. Lautoka, ix. 20 (*W. Greenwood*).

*Mordellistena consimilis*, sp. n.

Rufo-fulvous, pygidium about twice as long as hypopygium. Very similar to *M. dodoneæ*, but differing in the comb-ridges of the posterior tibiæ and tarsi. On the tibiæ are four ridges, one subapical, parallel with the apex, the other three longer, equal, and much more oblique, the uppermost extending from about halfway along the posterior edge almost to the base; the tarsal ridges are 3.2.2. Tibial spurs very unequal, the inner more than twice as long as the outer and reaching the third ridge of the first tarsal joint.

Length  $3\frac{2}{3}$  mm. with (3 mm. without) style.

4 ex., Labasa, Dec. 1921 (*R. Veitch*).

That the slight differences between this species and *M. dodoneæ* are not merely sexual is certain, since the ♂ of each, with the genital organs protruding, is identifiable. I am unable, however, to detect any obviously ♀ individual.

*Mordellistena gracilicauda*, sp. n.

Flavo-testaceous, with a long, slender, somewhat sinuate, anal style, more than three times as long as hypopygium. Combs of posterior tibiæ four in number, one very short subapical, parallel with apex, the second close to it and but little longer, but more oblique, then two very long, very strongly oblique, the first reaching halfway up the posterior edge of the tibiæ, the other starting a little above it and reaching almost to the base; tarsal combs distinct, 3.2.2. Tibial spurs very unequal, the inner nearly as long as the first tarsal joint.

Length  $2\frac{3}{4}$  mm. with (2 mm. without) anal style.

2 ex., Labasa, Dec. 1921 (*R. Veitch*).

Readily distinguished among the uniformly rufous or flavous species by its smaller size and paler coloration. The form of the anal style is very different, resembling that of *M. xanthocephala*, but the insect, apart from its different colour, is of rather stouter build and with very different tibial comb-ridges.

*On Two new African Hispid Beetles.*

LXVII.—*Two new African Hispid Beetles.*

By S. MAULIK.

THE two beetles described below belong to those groups of Hispidinæ which are characterized by the possession of at least one spine on the dorsal side of the first joint of the antennæ. The present species extend the genera *Monochinus*, Chap., and *Philodonta*, Weise, into which they naturally fall, to the African region.

*Monochinus capensis*, sp. n.

Body oblong, black; prothorax opaque, elytra subnitid.

*Head* broad, rugose, with a longitudinal median sulcation; eyes convex, with a row of silvery hairs round them. The antennæ hardly pass beyond the prothorax, the first joint the largest, the second small and rounded, the third to sixth gradually decreasing in size; the five apical joints forming a thickened and elongate club covered with brown pubescence, the six basal joints granulate and sparsely covered with whitish scale-like hairs. *Prothorax* broader than long, the sides rounded, armed with three spines, the anterior two having a common base, the posterior one situated at some distance from it, the front margin with two pairs of erect spines. The disc is rugose, sparsely covered with silvery hairs, and with a longitudinal impression along the middle; of the two transverse shallow depressions the posterior one is more marked than the anterior one. *Scutellum* with the apex rounded and surface granulate. *Elytra* broader at the base than the prothorax, punctate-striate, the punctures being large and deep. The surface is more shining than that of the prothorax; on each elytron there are three irregular series of spines, about thirty-five in number, including those on the humerus; there is a series of about twenty-one spines along the margin all round from the base to the sutural angle, those at the apex being stronger and larger. *Legs*: the front tibiæ are short and broadly emarginate at the apex, with brownish bristly hairs on the underside, the mid-tibiæ curved, the hind tibiæ similar to the front ones. Claws single.

Length 5 mm.

Cape of Good Hope, Table Mountain (type-locality); Howick, Natal (*J. P. George*).

Type in the British Museum.

Described from four examples.

*Phidodonta chirinda*, sp. n.

Body elongate, black, subnitid.

*Head* rugose, with a median sulcation and with a row of silvery hairs round each eye. The first joint of the antennæ is stout, bearing a dorsal spine, the third joint longer than the second, which is rounded; the fourth, fifth, and sixth rounded and almost equal, these joints bear a few bristly hairs; the five apical joints covered with brown pubescence; the apical joint pointed. *Prothorax* almost as long as broad, with the sides rounded; on each side three small blunt horizontal spines, the first two having a common base, the third being distant from the other two; on the front margin almost near the anterior angles there are two pairs of spines also pointing horizontally outwards. The disc is rugose and scattered over with adpressed silvery hairs; the transverse shallow depression behind the middle is more pronounced than the anterior one; on the alternate elevations in the middle there are small clear granulate areas with a central longitudinal impression. *Scutellum* broad, granulate, with a depression in the middle, the apex rounded. *Elytra* broader at the base than the prothorax, without hairs, and tuberculate; on each elytron there are eight ill-defined rows of large punctures, which are rounded or more or less hexagonal, some of them coalescing; the margins are toothed, with three or four spines at the apex.

Length 4 mm.

Mashonaland: Mt. Chirinda (type-locality), Nov.-Dec. 1901 (*G. A. K. Marshall*); Upper Buzi River, Portuguese East Africa, 25. 9. 1905 (*G. A. K. Marshall*).

Type in the British Museum.

Described from six examples.

LXVIII.—*The S. African Species of Attalus, Er., and some allied Forms [Coleoptera]*. By G. C. CHAMPION, F.Z.S.

In the March number of this Magazine, pp. 217-242, the present writer gave an account of the numerous S. African species of *Ebaeus*, Er., the ♂♂ of which exhibit remarkable characters in the structure of the apices of the elytra, &c. In the present contribution, *Attalus*, Er., and some allied genera are dealt with in the same way, most of these insects

wanting such structures: *Attalus* is of world-wide distribution, but seems to be poorly represented in Cape Colony; *Eucerapheles* may be said to replace *Anthocomus*\*, and *Notomalachius* to represent *Malachius*, in S. Africa. The description of a new *Hedybius* recently captured by Mr. Gedyé at Nairobi is also added.

#### ATTALUS.

*Attalus*, Erichson, Entomographien, p. 89 (1840); Abeille de Perrin, Ann. Soc. Ent. Fr. 1890, p. 400 (1891); Champion, Trans. Ent. Soc. Lond. 1914, p. 41.

A few S. African forms, mostly of small size, are referred to *Attalus*. They agree in having the anterior portion of head and the apices of the elytra simple in the two sexes, and the second anterior tarsal joint of the ♂ raised or produced at the tip above; one species, *A. bituberculatus*, has two small tubercles between the eyes in the same sex. The antennæ, which are greatly elongated in *A. oneili*, Pic, ♂, are more or less serrate, dentate, or pectinate. *Attalus ridens* and *ornatipennis*, Gorh., have been transferred by me to *Ebæus*; and *A. albofasciatus* and *A. lugens*, Gorh., and *A. marginipennis*, Ab., to the Dasytid-genus *Pagurodactylus*.

##### 1. *Attalus brevithorax*.

♀. *Attalus brevithorax*, Pic, L'Echange, xix. p. 152 (1903).

*Hab.* S. AFRICA, Dunbrody.

This insect is described as a large, broad, robust form (length 4 mm.), with a dull blackish head and prothorax (the reddish basal border excepted), shining cupreous, rather uneven elytra, and black antennæ (joints 1-3 in part excepted) and legs. A ♀ from Willowmore (*Dr. Brauns*), lent me by Dr. Péringuey, seems to be a variety of the same species with the red basal margin of the prothorax broader and extending forward along the sides to the anterior angles; the elytra brassy-cupreous, and closely, minutely punctate; the antennæ rather stout, long, with joints 5-10 triangular.

\* Boheman, Gorham, and Pic have included various S. African insects under *Anthocomus*, Er., but they are not really congeneric with the type of that genus, *Malachius sanguinolentus*, F.: *A. disjunctus* and *A. coronatus*, Boh., have been referred by me to *Pagurodactylus*, Gorh., group Dasytinæ; *A. ramicornis*, Boh., *A. apricus*, Gorh., and *A. martini* and *dunbrodensis*, Pic, to *Ebæus*; and *A. coriaceus*, Gorh., to *Dasytes*.

2. *Attalus subasperatus*, sp. n.

♀. Moderately elongate, much widened posteriorly, somewhat shining, clothed with very fine cinereous pubescence intermixed with long, erect, bristly hairs; æneous, the antennæ, palpi, and legs black; the elytra densely, finely, the head and prothorax more sparsely, punctate. Head much narrower than the prothorax; antennæ rather slender, subscrate, joints 4-10 about equal in width. Prothorax transverse, rounded at the sides, feebly margined at the base. Elytra much broader than the prothorax, rapidly widened to near the apex, uneven, depressed along the suture anteriorly, separately rounded at the apex.

♂. Narrower, the head nearly as wide as the prothorax, the antennæ longer and stouter, tapering towards the tip, joints 5-10 triangular; elytra much less widened behind, dehiscent at the sutural angle; anterior tarsal joint 2 raised at the tip above the base of 3.

Length  $2\frac{1}{4}$ - $2\frac{3}{4}$  mm.

*Hab.* S. AFRICA, Ceres, Cape Province, alt. 1500 ft. (*R. E. Turner*: xii. 1920, i. 1921).

One pair. Distinguishable from its S. African allies by the brassy upper surface, the black legs and antennæ, and the intermixed bristly vestiture. The elytra in the ♀ have scattered smooth asperities, which are almost obsolete in ♂.

3. *Attalus bituberculatus*, sp. n.

♂. Moderately elongate, somewhat shining, pubescent; black, the basal joints of the antennæ in part, the base and sides of the prothorax to a greater or less extent, and the anterior and intermediate tibiæ, testaceous, the elytra olive-green; the elytra alutaceous and extremely finely punctate, the rest of the upper surface smoother. Head nearly or quite as broad as the prothorax, flattened and bi-impressed anteriorly, and with a small prominent tubercle on each side between the eyes; antennæ long, stout, sharply serrate from joint 5 onward, 4 also stout, triangular. Prothorax transverse, rounded at the sides, narrowed behind. Elytra subparallel at the base, a little widened posteriorly. Anterior tarsal joints 1 and 2 stouter than those following, 2 at the tip slightly raised above 3.

Length  $2\frac{3}{8}$  mm.

*Hab.* S. AFRICA, Prieska [x. 1887], Hengkries, Bushmanland [x. 1911] (*Mus. Cape Town*).



Two males, both worn. The anteriorly-flattened, interocularly bituberculate head and the long, stout, sharply serrate antennæ are conspicuous characters in the ♂ of this species.

#### 4. *Attalus serratus*.

*Attalus serratus*, Ab de Perrin, Rev. d'Ent. xix. pp. 164, 175 (♂ ♀) (1900).

♂. Antennæ elongate, joints 5-10 widened, sharply triangular; anterior tarsal joint 2 extending over 3 above.

♀. Antennæ more slender, short, feebly serrate; elytra more widened posteriorly.

*Hab.* S. AFRICA, Cape Town.

A small, short, rather convex, shining, bluish-black form, with a red prothorax, and black antennæ (the basal joints in part excepted) and legs; the prothorax convex, much rounded at the sides; the elytra sparsely feebly punctate, strongly transversely depressed below the base, clothed with long semierect hairs intermixed with the scattered decumbent pubescence. The type and three other specimens from the Cape have been lent me by Dr. Péringuey.

#### 5. *Attalus rufotibialis*, sp. n.

♂. Moderately elongate, widened posteriorly, convex, very shining, clothed with fine scattered pubescence intermixed with long semierect hairs; black, the prothorax, tibiae, and basal joints of the tarsi rufo-testaceous, the antennal joints 2-4 in part testaceous, the elytra nigro-cæruleous. Head short, subtriangular, much narrower than the prothorax, flattened anteriorly, finely punctured; antennæ moderately long, serrate, joints 4-10 triangular and about as long as broad. Prothorax transverse, rounded at the sides, sparsely, extremely finely punctate. Elytra wider than the prothorax, rather short, deeply transversely depressed below the base (the apical portion thus appearing convex), conjointly rounded at the tip; very sparsely, finely, rugulose punctate. Anterior tarsal joint 2 extending over 3 above, black at the apex.

Length  $2\frac{1}{2}$  mm.

*Hab.* S. AFRICA, Mossel Bay, Cape Province (*R. E. Turner*: iv. 1921).

One male. Separable from the closely allied *A. serripes*, Ab., by the clear rufo-testaceous tibiae (sharply contrasting with the black femora), and the very much shorter, serrate

antennæ in the ♂, those organs a little stouter and not longer than in the ♀ of that species. The stouter antennæ, black femora, and very sparsely punctured elytra distinguish *A. rufotibialis* from *A. dilaticollis*.

6. *Attalus dilaticollis*, sp. n.

♀. Rather short, much widened posteriorly, shining, clothed with fine cinereous pubescence intermixed with long bristly hairs; black, the basal six joints of the antennæ in great part, the prothorax, and legs rufo-testaceous, the elytra with a bluish lustre; the elytra closely, finely, the head and prothorax very sparsely and obsoletely, punctate. Head rather small, bi-impressed in front; antennæ slender, serrate from joint 4 onward. Prothorax strongly transverse, arcuately dilated at the sides, narrowed posteriorly. Elytra at the base scarcely as wide as the prothorax, comparatively short, rapidly widening to near the apex, deeply excavate on the disc below the base.

Length  $2\frac{1}{2}$  mm.

*Hab.* S. AFRICA, Cereus, Cape Province (R. E. Turner : xi. 1920).

One specimen. Not unlike the European *A. dalmatinus*, Er., but smaller and less elongate; the antennal joints 4-10 triangular, the prothorax relatively more dilated at the sides, the elytra shorter, excavate below the base, and much more finely punctured, the legs rufo-testaceous.

7. *Attalus testaceipes*, sp. n.

♂. Moderately elongate, shining, clothed with fine cinereous pubescence intermixed with erect, dark, bristly hairs; black, the antennal joints 1-4 in part, the prothorax (an infuscate median vitta, extending from apex to near the base, excepted), and legs testaceous, the elytra nigro-cæruleous; the head and prothorax obsoletely, the elytra densely, finely punctate. Head narrower than the prothorax, the eyes somewhat prominent; antennæ moderately long, rather slender, serrate from joint 5 onward. Prothorax transverse, convex, narrowly margined, rounded at the sides. Elytra at the base about as wide as the prothorax, widening to near the apex, depressed along the suture below the base. Legs slender; anterior tarsal joint 2 raised at the apex above the base of 3.

Length 2 mm.

*Hab.* S. AFRICA, Grahamstown (*ex coll. Fry*).

One male. A very small setose form, with a testaceous fusco-vittate prothorax, bluish elytra, and testaceous legs. The general coloration is like that of *A. africanus*, Pic (? = ♀ of *Ebæus ramicornis*, Boh.), except that the legs are testaceous.

8. *Attalus frerensis*, sp. n.

♀. Moderately elongate, rather broad, much widened posteriorly, shining, somewhat thickly clothed with semi-erect hairs; black, the antennal joints 2 and 3 partly testaceous, the prothorax rufo-testaceous, the elytra cæruleous; the elytra densely, finely, the head and prothorax sparsely, obsoletely punctate. Head rather small; antennæ moderately long, serrate from joint 4 onward. Prothorax convex, transverse, rounded at the sides, grooved within the basal margin. Elytra much broader than the prothorax, depressed on the disc below the base.

Length  $2\frac{1}{2}$ –3 mm.

*Hab.* NATAL, Fiere (Dr. Marshall: ix. 1891, x. 1892).

Five ♀ ♀ seen. Separable from *A. serratus*, Ab., ♀, by the blue, closely punctured elytra and the more elongate shape. The triangular antennal joints 4–10, and the shorter and broader form, distinguish *A. frerensis* from *A. lusitanicus*, Er., and its European allies.

9. *Attalus cæruleonitens*, sp. n.

♀. Moderately elongate, widened posteriorly, shining, clothed with rather long, decumbent pubescence; head and prothorax brassy-black, the elytra cæruleous, the rest of the body, antennæ, and legs black; the elytra densely, finely, the head and prothorax sparsely, obsoletely punctate. Head much narrower than the prothorax, bi-impressed in front; antennæ rather long and slender, serrate, joints 4–10 longer than broad. Prothorax transverse, convex, rounded at the sides. Elytra at the base much broader than the prothorax, rapidly widened to near the apex, transversely depressed before the middle, and with an indication of two or three raised lines on the disc, the apices broadly conjointly rounded.

Length  $2\frac{1}{2}$  mm.

*Hab.* S. AFRICA, Piet Retief, Transvaal (R. Crawshay, in *Mus. Brit.*).

Two ♀ ♀ received by the Museum in 1904. The densely punctured elytra brings this species near *A. frerensis*, from which it is distinguished by the brilliant brassy black head and prothorax, and the more slender antennæ.

10. *Attalus subcæruleus*, sp. n.

♀. Moderately elongate, somewhat robust, much widened posteriorly, shining, clothed with semierect hairs; black, the antennal joints 1-4 partly testaceous, the elytra cæruleous; the elytra sparsely, finely, the head and prothorax obsoletely punctate. Head much narrower than the prothorax, longitudinally bi-impressed in front; antennæ long, sharply serrate from joint 4 onward. Prothorax convex, transverse, rounded at the sides, broadly grooved within the basal margin, the latter somewhat raised. Elytra at the base about as wide as the prothorax, rapidly widening thence to near the apex, depressed on the disc below the base, the suture cariniform.

Length  $2\frac{3}{4}$ -3 mm.

Hab. NATAL, Malvern (*Mus. Durban* : ix. 1897, x. 1900).

Two ♀ ♀. Smoother and more shining than *A. frerensis*; the antennæ (♀) longer and more sharply serrate, with joints 2-4 paler; the elytra sparsely punctured, and with the suture raised; the prothorax black. The form of the antennæ is like that of *Ebaeus ramicornis*, Boh., ♀. Another ♀, with similar antennæ and a testaceous prothorax, from the Ifafa Mts., Natal (*Mus. Durban*), may be a variety of *E. subcæruleus*.

11. *Attalus sulcicollis*, sp. n.

Extremely like *A. subcæruleus* and similarly coloured; antennæ (♂) long, rather slender, joints 5-10 triangular, longer than broad (much less dilated than in *A. subcæruleus*, ♀), (♀) much shorter and more slender, joints 5-10 about as broad as long; prothorax with a narrower and more sharply defined transverse groove in front of the basal margin; the elytral suture not raised.

Length  $2\frac{1}{2}$  mm.

Hab. S. AFRICA, Willowmore, Cape Colony (*Dr. Brauns* : l. x. 1900).

One pair, the ♀ retained for the British Museum. A form of *A. subcæruleus* requiring a distinctive name.

12. *Attalus oneili*.

*Attalus oneili*, Pic, L'Echange, xix. p. 152 (♂ ♀) (1903).

♂. Antennæ very elongate, joints 5-8 triangular, 9 and 10 narrower, 7-10 longer than those preceding; anterior tarsal joint 2 extending over the base of 3.

♀. Antennæ more slender, short, feebly serrate.

*Hab.* S. AFRICA, Dunbrody.

There is a specimen (♂) of this species in the Marshall collection and three others (♂ ♀) in the Cape Town Museum. It differs from *A. serratus*, Ab., in having a black prothorax (the testaceous outer margins excepted), metallic-blue, feebly impressed, and more distinctly punctured elytra, and testaceous legs (the infuscate femora excepted); the ♂, moreover, has still longer antennæ.

### 13. *Attalus atosignatus*, sp. n.

♂. Rather short, shining, clothed with scattered semierect bristly hairs; black, the antennal joints 2-4, the sides of the prothorax broadly, the elytra (a common broad basal fascia and a large transverse spot on the disc of each beyond the middle excepted), the tibiæ, and the tarsi in part, testaceous; the head and prothorax very finely, the elytra sparsely, conspicuously punctate. Head rather long, rhomboidal, much narrowed behind the eyes; antennæ moderately long, strongly pectinate from joint 5 onward. Prothorax transverse, convex, rounded at the sides, feebly margined. Elytra comparatively short, not covering the apex of the abdomen, broader than the prothorax, widened posteriorly, separately rounded at the apex, depressed along the suture below the base. Anterior tarsal joint 2 raised at the apex over the base of 3.

Length  $2\frac{1}{2}$  mm.

*Hab.* S. AFRICA, Witzenberg Valley, S.W. Cape Province, alt. 3000 ft. (*R. E. Turner*: 19. i. 1921).

One male. A small, shining, nigro-maculate form, with the elytra comparatively short, the head much narrowed behind the eyes, the antennæ pectinate in ♂.

### 14. *Attalus ceresensis*, sp. n.

♂. Moderately elongate, feebly shining, brassy-black, clothed with fine pubescence intermixed with long, erect hairs; the head and prothorax closely, minutely, the elytra densely, rugulosely punctate, the latter with scattered asperities. Head rather long, bi-impressed in front, the eyes rather prominent; antennæ elongate, rather stout, serrate, joints 4-10 elongate-triangular, 8-11 gradually becoming narrower. Prothorax wider than the head, as long as broad, narrowly margined, feebly rounded at the sides, longitudinally compressed on each side of the disc. Elytra broader than the prothorax, slightly widened posteriorly, rounded at the tip.

Legs very long; anterior tarsal joint 2 extending over the base of 3.

♀. Antennæ much shorter and more slender, subserrate, joints 4–11 of equal width; elytra much widened posteriorly.

Length  $2\frac{1}{2}$  mm.

*Hab.* S. AFRICA, Ceres, Cape Province (*R. E. Turner*: xi., xii. 1920).

Two ♂♂ and one ♀, the latter with subtuberculate greenish elytra. The long, laterally-compressed prothorax and sparsely asperate elytra give this insect an appearance very different from that of a normal *Attalus*, with which it agrees in the structure of the ♂ anterior tarsi, &c. The general facies is that of a Dasytid. The similarly coloured *A. subasperatus*, from the same locality, has a strongly transverse convex prothorax, much shorter antennæ in ♂, &c.

#### PELOCHROUS.

*Pelochrous*, Rey, Vésicufères, p. 188 (1867); Abeille de Perrin, Ann. Soc. Ent. Fr. 1890, p. 341 (1891).

This Palearctic and N. African genus has hitherto included four very small, testaceous, Anthobiiform Malachiids, with simple, 5-jointed anterior tarsi in the males, the three terminal dorsal segments of the abdomen exposed, and the head and elytra unimpressed in both sexes. A minute black form from the Cape can be provisionally referred to *Pelochrous*.

##### 1. *Pelochrous perpusillus*, sp. n.

♂. Moderately elongate, widened posteriorly, finely pubescent, shining; black or piceous, the antennal joints 2–4; the apices of the tibiæ, and the tarsi in part, testaceous; the head and prothorax alutaceous, sparsely extremely minutely punctate, the elytra rugulosely punctured. Head transverse, nearly as wide as the prothorax; antennæ rather slender, short, joints 4–10 about as broad as long, subtriangular. Prothorax transverse, convex, rounded at the sides. Elytra moderately long, incompletely covering the abdomen. Anterior tarsi with joints 1–4 short, subequal in length. Tarsal claws small, angulate at the base beneath.

♀. Antennæ a little shorter; last two dorsal abdominal segments exposed.

Length  $1-1\frac{1}{10}$  mm.

*Hab.* S. AFRICA, Ceres, Cape Province (*R. E. Turner*: xi. 1920, i. 1921), Stellenbosch, Cape Town (*Mus. Cape Town*).

Six examples. Separable from *Attalus* by the simple 5-jointed anterior tarsi of the ♂, a character bringing *P. perpusillus* near *Anthocomus*.

EUCERAPHELES, gen. nov.

Antennæ inserted at a little before the eyes beneath the outer angles of the epistoma, 11-jointed, serrate; head short in ♀, transversely subquadrate and deeply excavate posteriorly in ♂, the epistoma very short, truncate anteriorly, confused with the front; terminal joint of maxillary palpi slender, conical; clypeus and labrum short; prothorax transverse and strongly rounded at the sides in ♀, broadly bilobato-cucullate anteriorly in ♂; elytra much wider than the prothorax, simple in the two sexes; anterior tarsi 5-jointed, 1 and 2 thickened, and 2 extending over the base of 3 and with a rudimentary comb at the tip, in ♂; tarsal claws with a membranous lobe at the base; body robust, elongate.

Type, *E. occultus*.

The single S. African species included in this genus has the general facies of *Cerapheles lateplagiatus*, Fairm., and *terminatus*, Mén.; but it is more nearly allied to *Hedybius*, differing from the latter in the peculiar development of the head and prothorax in the ♂, the broad, hood-like extension of the anterior portion of the latter almost covering the deep transverse basal cavity of the head. *Eucerapheles* is another genus of Malachiids that must be based mainly on ♂-characters. *Pseudocerapheles*, Pic (1914), from the Himalaya, seem to be on a somewhat similar footing.

1. *Eucerapheles occultus*, sp. n.

♂. Elongate, widened posteriorly, shining, cinereo-pubescent; æneous or greenish, the mouth-parts, antennæ (the three or four black apical joints excepted), prothorax (a very broad transverse space extending across the middle of the disc, sometimes broken up into an oblong scutiform patch and a small spot on each side of it, excepted), and anterior and intermediate legs, testaceous; the head and prothorax closely, excessively finely, the elytra roughly, punctured. Head (when seen extended) considerably developed and very gradually narrowed behind the eyes, the cavity on the vertex very broad, deep, and pubescent, bearing a long, erect, spiniform, matted tuft of hairs in the

centre, the basal margin of the cavity ciliate; eyes not prominent; antennæ moderately long, rather stout, joints 7-10 transverse. Prothorax wider than the head, convex, narrowly margined, as long as broad; rapidly, obliquely narrowed anteriorly and posteriorly, the anterior portion broadly produced, subtruncate in front, and depressed down the middle, thus appearing sub-bilobed. Elytra moderately elongate. Anterior tarsal joint 2 with the comb at the tip black.

♀. Head less developed behind the eyes, simple, rather convex; antennæ very short, more slender; prothorax broader than long, rounded at the sides, narrowed posteriorly; elytra more widened behind.

Length  $3\frac{1}{2}$ – $4\frac{1}{2}$  mm. (♂ ♀.)

*Hab.* S. AFRICA, Prieska (♂ ♀: types), Cape Town (Dr. Purcell).

Five ♂♂ and one ♀ of this species have been sent me for determination by Dr. Péringuey, all from the Cape Town Museum.

#### NOTOMALACHIUS, gen. nov.

Antennæ inserted beneath the outer angles of the epistoma at some distance before the eyes, 11-jointed, simply serrate in the two sexes, joint 2 very short; head rather short, simple in ♂, the epistoma broadly truncate anteriorly and confused with the front; labrum short; terminal joint of maxillary palpi oblongo-conic, truncate at tip; prothorax transverse, nearly as wide as the elytra, the latter long, subparallel, incompletely covering the abdomen, simple; anterior tarsi 5-jointed, simple in ♂; tarsal claws with membranous lobe; anterior tibiæ more or less bowed inwards and distinctly widened at tip, more distinctly so in ♂; body villose.

Type, *Hapalochrus dollmani*, Champ.

The type of the genus, in the absence of the ♂, was provisionally included by me under *Hapalochrus* in 1920\*. Males of the same species have since been found in the collections under examination. The distinctly separated short second antennal joint, which is reduced to a connecting node at the apex of the first in *Hapalochrus*, s. str., and the different ♂-characters, distinguish *H. dollmani* from the last-named genus; and the broadly truncate epistoma, at

\* *H. dasytiformis*, Champ. (l. c. p. 188) = *Calosotis* (?) *barkeri*, Pic (L'Echange, xx. p. 66, 1904). This species has 10-jointed antennæ, and of course does not belong to the Dasytid-genus *Calosotis*, Redt., but the name *barkeri* must be used for it. *C. setulosa*, Redt., from the Cape, the type of which is before me, is very like a *Dasytiscus*.



the sides of which the antennæ are inserted, separates it from *Malachius*. In Abeille de Perrin's table of the "Malachiaires" the present genus works out near *Anthocomus*, from which it differs in the broadly truncate epistoma, the peculiar form of the anterior tibiæ, the villose body, simple elytra in ♂, &c. *Malachius cærulescens*, Boh., from Boschjesmanus Rand, is probably a ♀ of *Hapalochrus mashunus*, Gorb., and *M. caffer*, Boh., another *Hapalochrus*, near *H. nitens*, Gorb.

### 1. *Notomalachius dollmani*.

*Hapalochrus dollmani*, Champ. Ann. & Mag. Nat. Hist. (9) vi. p. 313 (♀) (Oct. 1920).

♂. Antennæ elongate, rather stout, joints 3 and 4 longer than broad, subequal, 5-10 elongate-triangular, 11 narrow, a little longer than 10; anterior tibiæ widened and incurved at the apex.

♀. Antennæ shorter and more slender, joints 3-10 subequal in length; anterior tibiæ a little less widened at apex.

Length  $3\frac{1}{4}$ -6 mm. (♂ ♀.)

Var. Tibiæ infuscate.

Hub. S. AFRICA (*Mus. Cape Town*: ♂, var.), Bulawayo (*Mus. Cape Town*; ♂), Marico, Transvaal (*Dr. Brauns*, 20.i.1921: ♀), Frere and Estcourt, Natal (*Dr. Marshall*: x. 1902, x. 1906: ♂ ♀, var.), Umtali, Mashonaland (*A. Bodong*, in *Mus. Brit.*, i. 1906: ♂), N.W. Rhodesia (*Dollman*: ♀, type).

Twelve specimens seen in all, including ♂ ♂ of each form.

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Since the publication of the revision of the African species of *Hedybius* and its allies (Ann. & Mag. Nat. Hist., Nov. 1921), an interesting new form taken at Nairobi has been sent me by Mr. Gedyce\*.

### *Hedybius ruficornis*, sp. n.

♂. Elongate, widened posteriorly, shining, clothed with pallid pubescence, which on the elytra is intermixed with bristly, longer, erect hairs, the prothorax with very long and soft hairs; metallic green, the head (except a curved black fascia at the base, which extends forward on each side to the

\* The Abyssinian *Troglops luteus* and *signatus*, Roth (1851), not mentioned in my paper on *Hedybius*, almost certainly belong to the last-named genus: *T. luteus* doubtless = *H. lividus*, Gorb. (1883), No. 6, and *T. signatus* is probably a variety of *H. limbatipennis*, Pic (1914).

eyes), prothorax, and abdomen (the black terminal segment excepted) testaceous or rufo-testaceous; the palpi and legs black or metallic. Head narrower than the prothorax, finely punctured anteriorly, with a longitudinal ridge on each side near the eyes and a transverse raised lamella in the middle between them, these elevated spaces separated by grooves extending forward from a deep transverse excavation near the base; antennæ stout, rather long, serrate. Prothorax convex, transverse, rounded at the sides; transversely depressed in the centre anteriorly, and with an angular prominence in the centre in front; very sparsely punctulate, grooved within the basal margin. Elytra rather long, wider than the prothorax, rounded at the apex, incompletely covering the abdomen, several segments of which are exposed; densely, rather strongly punctate. Anterior tarsal joints 1 and 2 slightly thickened, 2 distinctly raised above 3 at the tip. The exposed terminal dorsal segment of abdomen small, concave, shining, feebly emarginate at tip.

Length (to apex of elytra) 4½–5 mm.

*Hab.* E. AFRICA, Ngong Forest, Nairobi (*A. F. J. Gedye*: 18. x. 1920).

Two males, beaten from shrubs. This insect has the antennæ, prothorax, and the greater part of the head and abdomen rufo-testaceous, the elytra metallic green, and the palpi black. It is very different from any other species of the genus known to me, and perhaps comes nearest to *H. rufiventris* (No. 36), the ♀ only of which has been found.

*Alphabetical numbered list of species enumerated in the present paper; those marked with an asterisk are described as new, and all belong to Attalus, Er., except where otherwise stated.*

\**atrosignatus*, 13.  
 \**bituberculatus*, 3.  
     *brevithorax*, 7.  
 \**cæruleonitens*, 9.  
 \**ceresensis*, 14.  
 \**dilaticollis*, 6.  
     *dollmani* (*Notomalachius*), 1.  
 \**frereusis*, 8.  
 \**occultus* (*Euceraphes*), 1.  
     *oneili*, 12.  
 \**perpusillus* (*Pelochrous*), 1.  
 \**ruficornis* (*Eledybius*).  
 \**rufotibialis*, 5.  
     *serratus*, 4.

\**subasperatus*, 2.  
 \**subcæruleus*, 10.  
 \**sulcicollis*, 11.  
 \**testaceipes*, 7.

SPECIES OF *HEDYBIUS* AND  
*HAPALOCHRUS* INCIDENTALLY  
 MENTIONED.

*barkeri* (*Hapalochrus*), p. 580.  
*dasytiformis* ( " ), p. 580.  
*limbatipennis* (*Hedybius*), p. 581.  
*lividus* ( " ), p. 581.  
*luteus* ( " ), p. 581.  
*signatus* ( " ), p. 581.

LXIX.—On a new Toad, *Cophophryne alticola*, collected on the Mt. Everest Reconnaissance Expedition, 1921. By JOAN B. PROCTER, F.Z.S.

THREE species representing Reptilia and Batrachia were collected by Dr. A. F. R. Wollaston on the Mt. Everest Reconnaissance Expedition—specimens of the Agamoid lizard *Phrynocephalus theobaldi*, the frog *Rana* (*Nanorana*) *pleskei*, and a new and interesting toad of the genus *Cophophryne*. All were met with at altitudes of 14,000 to 17,000 feet, and possess the degenerate ears adapted to these heights, the tympanum being either hidden beneath thick skin or absent altogether.

The new species of *Cophophryne* may be easily distinguished from *C. sikkimensis*, Blyth, to which it is closely allied, by the fact that the toes are fully webbed instead of nearly free. It is described from a single female specimen, somewhat shrivelled up—in this case a useful condition, however, revealing the immensely dilated sacral diapophyses and strongly curved præcoracoids, so suggestive of *Pelobates*, which the genus so closely resembles.

*Cophophryne alticola*, sp. n.

Habit as in *C. sikkimensis*, Blyth.

Head moderate, broader than long, depressed; snout rounded; canthus rostralis rounded, loreal region very oblique; nostrils small, near tip of snout; interorbital space about as broad as upper eyelid; no tympanum, eustachian tubes vestigial.

Fingers moderate, first and second subequal; third about once and a half length of snout.

Hind limb moderate, tibio-tarsal articulation reaching posterior corner of eye; tibia goes twice and three-fifths in total length, and is about three and a half times as long as broad; toes moderate, with narrow webs reaching the tips of first and second toe, base of distal phalanx of third and fifth, and penultimate of fourth; subarticular tubercles absent; a very small oval inner metatarsal tubercle; tarsal fold absent (?) (*vide* text-fig. 1).

Skin covered with small roundish porous warts, arranged in irregular longitudinal series. Narrow indistinct glandular fold or paratoid behind each eye. Abdomen granular; throat and chest smooth; mammary-like glands, one on each side of chest.

Uniform greyish brown above ; warts darker ; lighter beneath.

A single female specimen, caught in the Kharta Valley, Tibet ; altitude 16,500 feet.

The stomach was entirely full of black weevils of the family Curculionidæ. According to Dr. Marshall, who has

Fig. 1.



Foot of *Cophophryne alticola*.  $\times 1\frac{1}{2}$ .

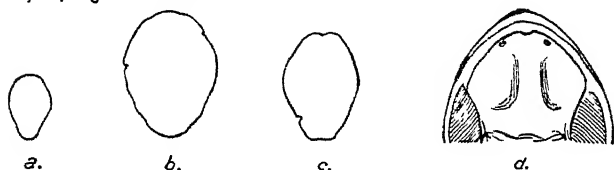
examined these specimens, new species of *Heteronyx* and *Dactylosus* are present ; but, as they are partially digested, their condition is not good enough to admit of their being described.

On examining all the specimens of *Cophophryne sikkimensis* and *Aelurophryne mammata* in the British Museum, it is now clear that they are not generically distinct. The tongue, which is described as nicked in the former and entire in the latter, may be very slightly nicked or entire in either species, and the eustachian tubes are vestigial and the tympanum absent in both (*vide* text-fig. 2). The reason why these orifices appear larger in Günther's specimens of "*Bufo mammata*," the types of the species on which the genus *Aelurophryne* was founded, is that these specimens are in an advanced state of decomposition, and the bony openings are therefore no longer padded and obscured by the usual buccal linings. The choanæ, on the other hand, are somewhat larger in *A. mammata* than in *C. sikkimensis* or *C. alticola*.

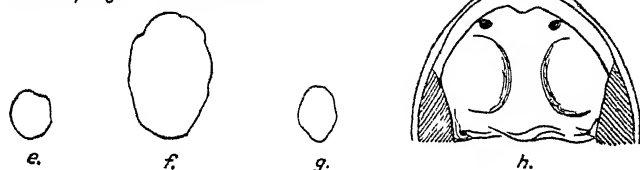
*Aelurophryne* must therefore be regarded as a synonym of *Cophophryne*, which will now consist of three species.

Fig. 2.

*Cophophryne sikkimensis*.



*Aelurophryne mammata*.



*C. alticola*



a, b, c. Tongues of *Cophophryne sikkimensis*.

e, f, g. " " *Aelurophryne mammata*.

i. " " *C. alticola*, sp. n.

d. Palate of *C. sikkimensis*.

h. " " *A. mammata*.

j. " " *C. alticola*.

$\times 1\frac{1}{2}$ .

### COPHOPHYRNE, Blgr.

*Bombinator*, part., Blyth, Journ. As. Soc. Bengal, xxiii. 1854, p. 300.

*Scutiger* (non Latr.), Theobald, Cat. Rept. As. Soc. Mus. 1868, p. 83.

*Bufo*, part., Gthr. Ann. Mus. Zool. St. Pétersb. 1896, p. 188; Anders.

P. Z. S. 1871, p. 204.

*Cophophryne*, Blgr. Ann. & Mag. Nat. Hist. 1887, ser. 5, xx. p. 406.

*Aelurophryne*, Blgr. Rec. Ind. Mus. xvi. 1919, p. 479.

Habit as in *Bufo viridis*. Pupil vertical. Tongue oval, free, sometimes slightly nicked behind. Eustachian tubes

scarcely visible; no tympanum. Fingers free; toes free or webbed, the tips not dilated; outer metatarsals united.

No maxillary teeth. Omosternum cartilaginous; sternum with slender bony style; præcoracoids strongly curved. Sacral diapophyses immensely dilated; urostyle monocondylous.

All three species possess a pair of mammæ-like pectoral glands, in which, together with the vertical pupil, absence of teeth, pectoral and pelvic characters, the genus resembles *Ophryophryne*. The latter genus may, however, be readily distinguished by its well-developed tympanum and pug-like physiognomy.

### *Key to Species.*

- I. Choanæ very small; toes free ..... *sikkimensis*.
- II. Choanæ moderate.
  - a. Abdomen smooth; toes free or nearly free ..... *mammata*.
  - b. Abdomen granular; toes  $\frac{1}{2}$  webbed. .... *alticola*.

At the present time there are, therefore, two allied genera connecting Bufonidæ and Pelobatidæ, but regarded until recently as belonging to the former family on account of the absence of teeth. These are *Cophophryne*, Blgr., and *Ophryophryne*, Blgr. In 1919 Mr. Boulenger (in describing *Aelurophryne*) remarks:—"As I am more and more losing faith in the importance of the presence or absence of teeth as a family character, I would suggest an alteration of the definition of Pelobatidæ so as to include these toothless forms. Although the definition will then be very vague indeed, the group will at least be expressive of the natural affinities of its constituents, which may be described as lowly forms approaching the Discoglossidæ, and leading, on the one hand, to the Cystignathidæ (through *Batrachopsis*) and, on the other, to the Bufonidæ."

As long as Pelobatidæ is maintained as distinct from Bufonidæ, this must certainly be the case, for the strongly curved præcoracoids, monocondylous urostyle, and enormously dilated sacral diapophyses place these genera much nearer to *Pelobates*\* and *Megalophrys* than to *Bufo*, especially so since the presence or absence of teeth can no longer be relied upon as a family character.

This being accepted, however, there is no longer a character, or combination of characters, by which one may separate these hitherto distinct families. For instance, as

\* The larval stage also bears this out, for the tadpole of *C. sikkimensis* resembles that of *Pelobates* in a very marked degree.

Fry has pointed out, the sacral diapophyses (which in Pelobatidæ are supposedly "strongly dilated") may be hardly dilated at all—for example, in *Batrachopsis* it is not more developed than in *Heleioporus* of the Cystignathidæ, and certainly less so than in any of the Bufonid genera. The urostyle may be ankylosed with the sacrum, monocondylous or dicondylous as in the Bufonids. In fact, there is not a character in which the range of variation given for Pelobatidæ will not cover Bufonidæ also. It is impossible to draw a line between the two, now that the generic relationships and sequences are made clear and that there is no longer the gap which formerly separated them, and which is now so amply filled by *Cophophryne* and *Ophryophryne*.

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LXX.—*Nouvelles Observations sur quelques Echinides néogènes de l'île d'Anguilla.* Par JULES LAMBERT (Troyes).

[Plate IX.]

GRÂCE aux bienveillantes communications de Messrs. Gregory et Bather, j'ai pu donner en 1915 une note sur les "Echinides néogènes des Antilles anglaises," conservés dans les collections du British Museum (Mem. Soc. Acad. de l'Aube, t. lxxix. pp. 17-33, pl. iii.). Mr. Bather a bien voulu me communiquer les nouveaux matériaux, qui me permettent d'ajouter quelques observations sur les espèces miocènes de l'île d'Anguilla, et par voie de conséquence de compléter la liste des Echinides néogènes des Antilles. Je lui adresse tous mes remerciements pour les facilités ainsi accordées à mes études et pour l'accueil fait à mon modeste travail par sa haute compétence.

*Clypeaster concavus*, Cotteau.

Deux individus bien typiques (nos. E. 12949 et E. 12950) de cette espèce déjà plusieurs fois signalée à Anguilla, par Cotteau, par Egozcue y Cia, par moi en 1915, et par Guppy, qui la confondait avec une forme certainement différente, le *C. ellipticus*, Michelin. Ce Clypéastre se distingue facilement par ses pétales fermés des *C. cotteaui*, Egozcue, du Miocène de Cuba, et *C. batheri*, Lambert, de celui d'Antigua. Il diffère des *C. antillarum*, Cotteau, et *C. lanceolatus*, Azpeitia, par ses bords plus épais, sublaganoïdes.

*Echinolampas lycopersicus*, Guppy.

Parmi les très nombreux individus de cette espèce, quelques uns m'ont été communiqués comme présentant des variations dans les caractères de leur apex et montrant des pores génitaux, soit plus développés (E. 12946 et E. 12947) soit plus nombreux (E. 12945) que chez le type de Guppy, très bien figuré par Cotteau à sa pl. iii. fig. 23, 26. Le développement un peu plus grand des pores génitaux me paraît avoir à peine la valeur d'une modification individuelle, si l'on admet que ces pores aient pu être légèrement élargis chez l'adulte par le passage du produit des ovaires. Mais ils me semblent avoir été plutôt agrandis par la fossilisation et par une certaine corrosion du test, fréquente surtout dans les calcaires grenus à nombreux foraminifères. Chez *E. lycopersicus*, comme chez beaucoup d'*Echinolampas*, les quatre pores génitaux sont souvent seuls distincts; mais, malgré leur perforation microscopique, les cinq ocellaires n'en existent pas moins. Or, chez l'individu E. 12945, ces pores ont simplement été encore élargis par une certaine corrosion du test. Je ne vois rien là qui dépasse un accident ordinaire de fossilisation.

*Lovenia gregoryi*, sp. n. (Pl. IX. figs. 5, 6.)

Cette espèce n'est malheureusement représentée que par un seul individu (E. 12951), latéralement comprimé, et qui devait mesurer avant cette compression 28 mm. de longueur, sur 20 de largeur et 12 de hauteur. Le sillon antérieur atténué, les pétales, les tubercules, les fascioles, la face inférieure non tuberculeuse, la face postérieure étroite reproduisent bien les caractères du genre.

Le test est peu épais, les scrobicules des gros tubercules sont profonds, en sorte que l'existence d'ampoules internes découle nécessairement de ces deux caractères. La face inférieure est subconvexe et le plastron tuberculeux seulement



vers l'extrémité. En dessus les tubercules scrobiculés forment un groupe de 6 à 7 dans les aires antérieures et d'une douzaine dans les aires latérales interambulacraires (fig. 6). La face postérieure concave est en grande partie occupée par le périprocte (fig. 5).

*L. gregoryi* ne saurait être confondu avec aucuns de ses congénères. Parmi les espèces miocéniques, en diffèrent *L. gauthieri*, Cotteau, par sa forme plus courte, gibbeuse en avant et ses tubercules scrobiculés bien plus rares, *L. peroni*, Cotteau, par sa forme plus large, presque arrondie; *L. forbesi* (Woods sub *Spatangus*) d'Australie a sa face inférieure plus plane. Quant au *L. lorioli*, Cotteau, il a plutôt les caractères d'un *Hemipatagus*.

*Loc.* Recueilli par Mr. J. W. Gregory dans le Miocène d'Anguilla, 1899.

### *Kleinia* sp.

Cette espèce n'est représentée que par deux individus, malheureusement en si mauvais état qu'ils ne permettent ni d'en donner une description complète, ni même de lui donner un nom.

Test légèrement comprimé et un peu moins long qu'il ne devait être originairement, mesurant 47 mm. de longueur, sur 40 de largeur et 26 de hauteur, oblong, arrondi et sinueux en avant, rétréci et subtronqué en arrière, à bords renflés et face supérieure faiblement convexe; apex légèrement excentrique en avant; pas de carène postérieure; face inférieure subconvexe; face postérieure empatée dans la roche. Sillon assez profond en dessus, mais atténué à l'ambitus. Pétale impair composé de très petits pores séparé par un granule et disposés par zygopores assez espacés; pétales pairs en arcs latéraux, subégaux; les deux postérieurs en arrière de l'apex sont d'abord dans une commune dépression, où ils semblent se réunir par suite de l'atrophie des deux zones porifères, sinon en contact, à peine séparées par une très étroite bande interambulacraire. L'atrophie porifère cesse vers le milieu des pétales, qui s'écartent alors en reprenant leur constitution normale, mais restent très peu divergents. Les pétales latéraux sont eux-mêmes peu divergents. Tubercules unifornes du genre; fasciole péripétale anguleux, enserrant de près les pétales sur les flancs et même en avant; le sous-anal en anneau est pourvu de blanches anales qui semblent le relier au péripétale; mais, comme tous les organes analogues, ces fascioles complémentaires sont peu distincts, très étroits, filiformes.

Cotteau n'avait fait connaître du Miocène d'Anguilla qu'un *Brissopsis* (*B. antillarum*), forme d'ailleurs très différente et qui rentre dans le genre *Brissoma*. Quant au *B. jimenoï*, Cotteau, de Cuba, c'est un véritable *Brissopsis*, de plus grande taille et ayant conservé l'intégrité de ses pétales postérieurs. Le *Brissopsis crescenticus*, Wright, 1855, qui lui est bien un *Kleinia*, est moins tronqué en arrière et ses pétales sont moins étroits. Enfin mon *Kleinia metaliceformis* se distingue facilement de l'espèce d'Anguilla par sa taille, ses pétales pairs moins inégaux, les postérieurs bien plus courts\*.

Après avoir proposé de distinguer des vrais *Brissopsis* à pétales postérieurs encore séparés par une légère arête interambulacraire, les formes à pétales postérieurs confondus dans une commune dépression et pourvues de branches latérales anales (*Kleinia*), ou dépourvues de ces branches (*Zeugaster*), j'ai dû reconnaître, sur les observations de Mr. Mortensen, le peu de valeur de ces branches fasciulaires postérieures, leur importance souvent individuelle, et en conséquence réunir ces deux derniers genres. Quant à *Kleinia*, si le caractère sur lequel il est fondé est excellent en théorie, il faut reconnaître qu'il n'a guère pratiquement qu'une valeur subgénérique, en raison de son peu de constance.

*Loc.* L'individu décrit (E. 12959) aurait été recueilli à Anguilla sur un point nommé Cartouche Bay. Un autre très mutilé, E. 12958.

*Schizobrissus clevei*, Cotteau (sub *Peripneustes*).

Cette rare espèce n'est représentée que par un fragment, d'ailleurs nettement caractérisé par son fasciole et ses tubercules; il porte le no. E. 12957 et a été recueilli par Mr. Gregory.

On sait que le genre *Peripneustes*, Cotteau, 1875, tombe en synonymie de *Schizobrissus*, Pomel, 1869.

*Metalia batheri*, sp. n. (Pl. IX. figs. 1-3.)

Le genre *Metalia*, Gray, 1855, a pour type le *Spatangus sternalis*, Lamarck, vivant des Mascareignes et de Madagascar, et caractérisé par la réunion chez l'adulte des deux pétales postérieurs dans un sillon unique sur près de moitié de leur

\* Ce *Kleinia metaliceformis* appartient à la faune de la Molasse de Vence, et c'est par suite d'une erreur matérielle qu'il n'a pas été compris parmi les Echinides néogènes du Bassin du Rhône et ne figure pas au tableau de répartition des espèces de la page 229 de mon Mémoire: Descrip. Echin. terr. néog. bass. Rhône, fasc. iv. 1915 (Mem. Soc. paléont. Suisse, vol. xli.).

longueur ; ces pétales ne deviennent divergents qu'au delà et à une certaine distance de l'apex. C'est l'exagération d'une disposition que nous avons déjà constaté chez *Kleinia*, dont *Metalia* se distingue par sa forme plus massive, son plus grand périprocte et son fasciole sous-anal en écusson radié et non en simple anneau bilobé. Beaucoup de prétendus *Metalia* des auteurs n'ont pas leurs pétales postérieurs confluent, et je partage l'opinion de Pomel sur la convenance de les séparer en les reportant dans le genre *Prometalia*, Pomel, 1869, dont *Metallopsis*, Fourtau, 1913, est un simple synonyme. Ainsi sont pour moi des *Prometalia*, *Brissus rohillardii*, de Lorient, type du genre, *Metalia dicrana*, Clark, que j'avais depuis longtemps séparé dans ma collection du *Brissus maculosus*, Klein, synonyme du *Echinus spatagus*, Linn. Il faut y ajouter une grande espèce de la Mer Rouge, mesurant 132 mm. de longueur. Le genre remonte à l'Éocène avec *Prometalia mayeri* (Fourtau, sub *Metalia*). Sont au contraire de vrais *Metalia*, *M. gareti* (Al. Agassiz, sub *Xanthobrissus*), *M. costae*, Gasco, peut-être le *Plagionotus africanus*, Verrill, et notre nouvelle espèce du Miocène d'Anguilla.

Quant au *Metalia eurystoma*, Dames, de l'Éocène du Vercin, c'est un *Brissopsis*, et ce n'est même pas un *Kleinia*. *M. lonigensis*, Dames, rentre dans le sousgenre *Verbeekia*, Fritsch. *M. melitensis*, Gregory, est, comme l'a reconnu Stefanini, un *Brissoïdes*.

On peut donner du *Metalia batheri* la description suivante : espèce de taille relativement petite, mesurant 51 mm. de longueur, sur 40 de largeur et environ 24 de hauteur. Face supérieure médiocrement renflée, un peu déclive sur les flancs, avec apex très excentrique en avant, pourvu de ce côté d'un sillon peu profond et en arrière de cet apex d'une dépression unique pour les deux pétales postérieurs confondus sur la moitié de leur longueur ; une carène peu saillante fait suite à cette dépression et s'atténue avant d'atteindre la face postérieure. Face inférieure convexe, avec plastron légèrement saillant et sillon très atténué en dessous ; grand péristome sémilunaire, à fleur du test. Face postérieure étroite, subconcave, avec grand périprocte ovale. Pétale impair composé de très petits pores inégaux, séparés par un granule (fig. 3) ; pétales latéraux relativement courts, très divergents, presque droits, dans des sillons peu profonds, et à zones porifères larges ; les branches antérieures ont leur six zygo-pores les plus rapprochés de l'apex atrophiés ; pétales postérieurs au moins doubles en longueur des latéraux, confondus en arrière de l'apex dans un sillon unique, où ne se distinguent que les zones porifères des branches les plus éloignées de l'axe du test (I. b et V. a) ;

les branches en contact sont complètement atrophiées et l'on n'observe même plus entre elles les traces de l'aire interambulacraire impaire, qui semble avoir cessé d'aboutir à l'apex. Vers la moitié de la longueur des pétales postérieurs, leur sillon unique se divise et chaque pétale s'écarte de l'autre, en reprenant ses deux zones porifères normales et son individualité propre. Ces pétales ne deviennent cependant pas très divergents. Il y a deux fascioles : un péripétale très anguleux, fermant des coudes rentrants dans chaque interambulacre ; le sous-anal large, en écusson faiblement radié, avec amorces de deux branches anales qui ne remontent pas très haut et ne rejoignent pas le péripétale. Tubercules crénelés et perforés très uniformes, un peu plus gros et plus régulièrement disposés en dessous, plus petits, épars en dessus, mieux développés toutefois aux bords du sillon antérieur ; ceux circonscrits par le fasciole péripétale semblables aux autres.

*Loc.* Le holotype, qui est un individu complet (E. 12952), et un fragment paratype (E. 12961) ont été recueillis par Mr. Gregory dans le Miocène d'Anguilla.

*Schizaster loveni*, Cotteau. (Pl. IX. fig. 4.)

En raison de la fragilité de leur test, presque toujours déformés par la fossilisation, les *Schizaster* sont parmi les Echinides dont la détermination offre le plus de difficultés. En présence de matériaux trop souvent défectueux, les auteurs ont, suivant leur tendance personnelle, tantôt créé des espèces sur des caractères de valeur très inégale, et trop souvent interprété les espèces établies de façon assez fantaisiste. Les *Schizaster* fossiles des Antilles n'ont pas échappé à ce désir des auteurs de retrouver des formes méditerranéennes dans la région Caraïbe. Ainsi Guppy a cité aux Antilles le *S. scillæ*, sans d'ailleurs préciser celle des nombreuses formes alors confondues sous ce nom qu'il entendait désigner. Si Cotteau n'a pas suivi cette voie périlleuse pour les *Schizaster* d'Anguilla, lui-même et ensuite Egozcue sont retombés dans les anciennes erreurs en citant à Cuba les *S. scillæ* et *S. parkinsoni*. Il est d'ailleurs certain que sous le nom du premier ils n'entendaient pas désigner la forme typique du Tortonien de Malte, mais plutôt le *S. eurynotus*, Agassiz. Egozcue a d'ailleurs figuré son *S. scillæ* (lam. xxvi. fig. 4, 5), et il est facile de constater que ce n'est ni le véritable *S. scillæ*, ni même le *S. eurynotus*, de forme plus retrécie et coincée en arrière, avec apex plus excentrique et pétales postérieurs

moins larges, plus effilés, et pores plus atrophiés près de l'apex. Il est préférable de le séparer comme nouvelle espèce sous le nom de *S. egozcuei*. J'estime qu'il faut également retrancher de la liste des espèces miocéaniques des Antilles le *S. parkinsoni*.

Les deux espèces signalées par Cotteau à l'île d'Anguilla sont assez difficiles à bien comprendre, en raison de ce que celle décrite sous le nom de *S. loveni* a été représentée par des figures dont les caractères sont en contradiction avec ceux mentionnés au texte. Je possède heureusement un individu d'Anguilla, déterminé par Cotteau lui-même comme *S. loveni*; c'est bien, comme il le dit, l'espèce la moins rare, puisque sept individus me sont communiqués; leur forme générale varie suivant les déformations de leur test, toujours très fragile, souvent comprimé. L'examen attentif de tous ces individus permet d'ajouter à la description de Cotteau que l'apex ne porte que deux pores génitaux, en sorte que cette espèce, malgré son très faible sillon à l'ambitus, paraît devoir rentrer dans la section *Brisaster*, Gray. Le fasciole très sinueux passe directement de l'extrémité des pétales latéraux aux bords du sillon qu'il suit avant de le franchir. Les individus jeunes sont semblables aux adultes, et leurs pétales latéraux sont déjà nettement flexueux.

Le *S. loveni* ainsi compris se distingue facilement du *S. clevei* par sa forme moins large, moins trapue, la présence de deux pores génitaux seulement à l'apex, ses pétales postérieurs moins profonds et ses zones poiffères moins longuement atrophiées vers l'apex dans tous les pétales pairs. Le fasciole péripétale du *S. loveni* est plus étroit; il ne s'élargit pas autant à la traversée des aires ambulacraires; il présente en avant des coudes rentrants et borde le sillon, tandis que celui du *S. clevei* se dirige directement de l'extrémité des pétales latéraux au point où il franchit le sillon antérieur.

Quant aux figures données par Cotteau de son *S. loveni*, il semble bien que le type de la figure 9, de forme épaisse, trapue, à pétales postérieurs profonds, soit en réalité un *S. clevei* et que le dessinateur ait commis une confusion entre les deux espèces. D'autre part le petit individu des fig. 10, 13, à périprocte arrondi et pétales droits, est évidemment un *Linthia* et non un *Schizaster*. La comparaison à ces figures d'un *S. loveni* de même taille ne laisse aucun doute à ce sujet, et je propose de nommer ce *Linthia*, *L. anguillæ*, sp. n.

*Loc.* Les individus communiqués portent les nos. E. 12965, bien conservé, et les autres passables E. 12956, E. 12960, E. 12962, E. 12963, E. 12966 et E. 12955.

*Schizaster clevei*, Cotteau.

Cette espèce, plus rare que la précédente, est représentée par un individu complet (E. 12953) et un fragment (E. 12954). Le premier mesure 44 mm. de longueur, sur 42 de largeur et 30 de hauteur; il permet de compléter la description donnée par Cotteau\* en faisant connaître que l'apex subcentral porte quatre pores génitaux, que le péristome réniforme est faiblement labié, que le périprocte ovale s'ouvre au sommet de la face postérieure. Le fasciole péripétale, très net, s'élargit à la traversée des aires ambulacraires; il franchit le sillon un peu au-dessus de l'ambitus et gagne directement l'extrémité des pétales latéraux, puis il s'éloigne de ceux-ci pour s'en rapprocher par un coude brusque, au voisinage de l'apex, et atteindre obliquement l'extrémité des pétales postérieurs. Le fasciole latéral étroit se détache du péripétale au coude brusque qui vient d'être signalé et, restant très haut, se dirige vers le périprocte, mais, arrivé aux ambulacres, il s'infléchit brusquement pour aller passer très au-dessous du périprocte. Un autre caractère du *S. clevei* réside dans l'atrophie des pores des pétales pairs au voisinage de l'apex: dans chaque zone les six dernières paires sont restées formées de petits pores ronds.

On ne peut guère comparer *S. clevei* qu'à mon *S. barciensis* du Miocène espagnol, mais ce dernier, plus élargi en arrière, a son sillon plus profond et plus excavé, ses pétales postérieurs plus long, et enfin seulement deux pores génitaux à l'apex.

Guppy, dès 1866, avait cité dans le Miocène d'Anguilla 8 espèces d'Echinides †, la plupart avec des déterminations erronées, rectifiées depuis par Cotteau, qui, dans son Mémoire de 1875, a doublé ce nombre. En ajoutant à ces espèces celles que nous venons de décrire on obtient pour les Echinides du Miocène de l'île d'Anguilla la liste suivante:—

*Cidaris melitensis*, Forbes.

— *anguillæ*, Cotteau (radiole).

*Dorocidaris clevei*, Cotteau (*Cidaris*).

*Parasalenia prisca*, Cotteau (*Echinometra*).

*Sismondia anguillæ*, Cotteau.

\* 1875. 'Echinides tertiaires des îles St. Barthélemy et Anguilla,' p. 29, pl. v. fig. 7, 8 (Svenska Vet.-Ak. Handl., Bd. xiii.).

† "On Tertiary Echinod. from the West Indies," Q. J. G. S. t. xxii. p. 297 (1866).

- Clypeaster antillarum*, Cotteau.  
 — *concaus*, Cotteau.  
*Echinoneus anguillæ*, Lambert †.  
*Echinolampas anguillæ*, Cotteau.  
 — *lycopersicus*, Guppy.  
 — *semiorbis*, Guppy.  
*Lovenia gregoryi*, Lambert, sp. n. (v. supra).  
*Brissoma antillarum*, Cotteau (*Brissopsis*).  
*Kleinia* sp.  
*Schizobrissus clevei*, Cotteau (*Peripneustes*).  
*Metalia batheri*, Lambert, sp. n. (v. supra).  
*Brissus exiguus*, Cotteau.  
*Linthia anguillæ*, Lambert, sp. n. (v. supra).  
*Schizaster clevei*, Cotteau.  
 — *loveni*, Cotteau.

Pour compléter ces renseignements sur la faune néogène, il y a lieu d'ajouter à cette liste deux espèces du Pliocène :—

- Clypeaster rosaceus*, Lamarck.  
*Brissopsis atlantica*, Mortensen.

Mais pour avoir une idée plus exacte de la faune Echinique du Miocène des Antilles, il convient de mentionner ici les trois espèces d'Antigua (affectées d'un \*) et, avec elles, celles du Miocène de Cuba :—

- \* *Clypeaster batheri*, Lambert, 1915.  
 — *cotteaui*, Egozcue.  
 — *cubensis*, Cotteau.  
 — *elongatus*, Egozcue (*Laganum*) ‡.  
 — *lanceolatus*, Azpeitia.  
 \* — *parvus*, Duchassaing.  
 — *planipetalum*, Azpeitia.  
 \* *Anomalanthus gregoryi*, Lambert, 1915.  
*Encope cixæ*, de Cortazar.  
*Brissopsis jimenoi*, Cotteau.

† Voir 'Essai de Nomenclature raisonnée des Echinides,' fasc. v. p. 334 (sous presse).

‡ En nommant l'espèce figurée à sa pl. iv., *Laganum elongatum*, Egozcue avait perdu de vue qu'il existait déjà un *L. elongatum*, Agassiz, avec quatre pores génitaux à l'apex et qui devra rentrer dans le genre *Rumphia*. Si l'apex de l'espèce du Miocène de Matanzas est inconnu, l'absence chez elle de rosette buccale, la présence à la face orale de sillons simples jusqu'au bord, ne permettent de la laisser ni parmi les *Laganum*, ni parmi les *Rumphia*, et nous avons dû la reporter parmi les *Clypeaster* dans la section *Rhaphidoclypus* (Essai de Nomencl. rais. des Echin. fasc. iv. p. 302; 1914).

*Pericosmus roigi* (Lambert) †.

*Agassizina clevei*, Cotteau ‡.

*Schizaster egozcuei*, Lambert, sp. n. §

D'après une récente communication de Mr. Sanchez Roig, il faut ajouter à cette liste : *Brissoirles cubensis*, Cotteau (sub *Breynia*), dépourvu de fasciole périapical et attribué avec doute par son auteur à l'Eocène, mais dont un individu de San Antonio de Cabezas près Matanzas a été recueilli dans le Pliocène. Une autre espèce du Miocène inférieur de La Havanne est un petit échinide subglobuleux appartenant à un genre nouveau de la famille *Aeropsidæ* et qui devra se placer près d'*Orulaster*.

#### EXPLANATION OF PLATE IX.

Fig. 1. *Metalia batheri*, sp. n., holotype, E. 12952; face supérieure.

Fig. 2. Ditto, holotype; face inférieure.

Fig. 3. Ditto, E. 12961; pores et tubercules du pétale impair; la ligne médiane est à droit; agrandis.

Fig. 4. *Schizaster loveni*, Cotteau, E. 12965.

Fig. 5. *Lovenia gregoryi*, sp. n., holotype, E. 12951, face postérieure, avec le périprocte dans la moitié supérieure de la dépression.

Fig. 6. Ditto, holotype; face supérieure.

Toutes les figures, sauf fig. 3,  $\times \frac{1}{2}$ .

LXXI.—*Galoncus tridentatus*, sp. n., a new *Ankylostome* living in fibrous Nodules in the Intestine of a Leopard.  
By M. KHALIL ‖.

THE material for this study was collected from a leopard that died in the Gardens of the Zoological Society of London. The intestine of the animal was studded with a large number of hard nodules projecting into the lumen of the gut. On

† = "*Hemipatagus hoffmanni*, Goldfuss," of M. S. Roig, 1920, 'Boletín de Minas,' no. 6, p. 5, fig. 24. "*Meoma roigi*," Lambert, 1921, *Revue Critique de Paléozoöl.*

‡ Cotteau a réuni sous ce nom deux espèces: l'une, celle du type miocène, est figurée pl. vi. fig. 2, 8; l'autre, plus grande, de l'Eocène, a son sommet plus gibbeux et ses pétales latéraux plus divergents. Je lui donne le nom d'*Agassizina egozcuei*, sp. n.

§ Je donne ce nom au *Schizaster scillæ*, Cotteau et Egozcue [non Desmoulins (*Spatangus*)], figuré par Egozcue, lam. xxvi. fig. 4, 5, et qui diffère tant du *S. scillæ* du Tortonien que des *S. eurynotus*, Agassiz, et *S. parkinsoni*, DeFrance, du Langhien (*v. supra*, p. 592).

‖ From the Helminthological Department, London School of Tropical Medicine.

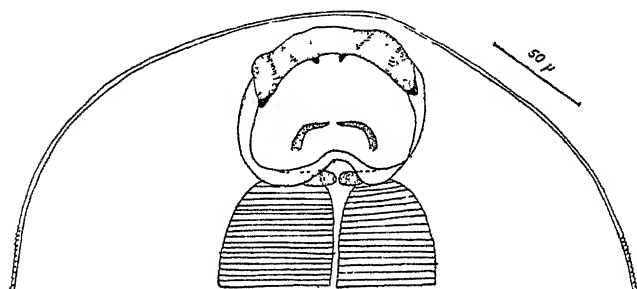


teasing these nodules a nematode was found. It was not possible to secure complete specimens of the worms, owing to the narrow winding tracts. The head end and the bursa of the male were, however, secured, including a specimen showing the whole length of the spicules.

The cuticle is finely striated throughout the length of the body at intervals of 0.002 mm. The outline of the worm is wrinkled in appearance. The maximum diameter of the body is .45 mm., the body tapers very little towards the anterior end; posteriorly the body narrows considerably. Just anterior to the bursa, the diameter of the body is 0.27 mm.

The mouth-capsule is very small in size in comparison with the breadth of the worm at the same level. Its opening looks dorsally and is practically rounded in outline. It is 0.075 mm. in length and 0.1 mm. in breadth. The diameter

Fig. 1.



*Galoncus perniciosus*, von Linstow. Mouth-capsule.

of the body at the posterior margin of the mouth-capsule is 0.26 mm. Three pairs of teeth project from the ventral wall of the mouth-capsule near its outlet. The most lateral teeth are the largest and the two inner teeth are smallest. The latter lie close together on either side of the middle line. Two conical dorsal teeth, one on either side, project freely from the floor of the mouth-capsule. Their apices bend inwards towards each other. These teeth lie on either side of the duct of the dorsal œsophageal gland. Two additional teeth project from the ventral wall of the mouth-capsule close to its floor.

The cavity of the mouth-capsule becomes narrower towards the beginning of the œsophagus (figs. 1 & 2).

There is no distinct œsophageal funnel. The œsophagus

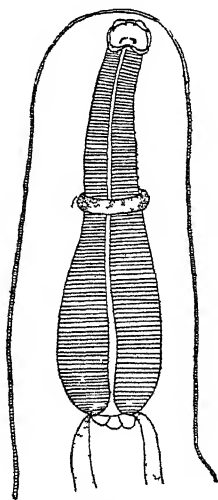
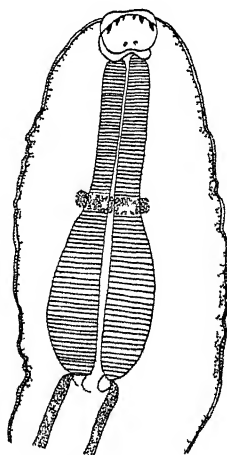
is 0.7 mm. in length and 0.23 mm. in maximum diameter. Its anterior half is narrow and practically cylindrical. Its posterior half is bulbous. At the junction of both parts the nerve-ring surrounds the œsophagus (figs. 3 & 4).

Fig 2

*Galoncus tridentatus*, sp. n. Mouth-capsule

Fig. 3.

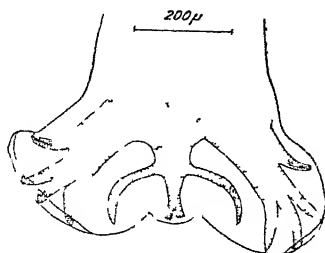
Fig 4

*Galoncus perniciosus*, von Linstow.  
Anterior end of body*Galoncus tridentatus*, sp. n.  
Anterior end of body.

The chyle intestine takes a straight course along the longitudinal axis of the body. Its walls are pigmented, except at its beginning and at its termination.

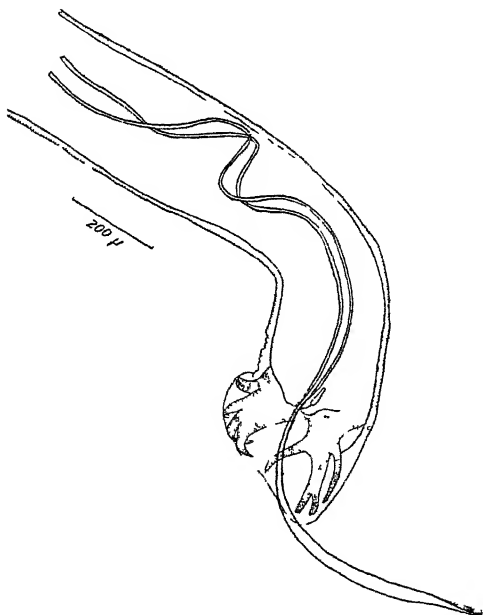
The nerve-ring surrounds the œsophagus at a distance of 0.4 mm. from the head end.

Fig. 5.



*Galoncus tridentatus*, sp. n. Dorsal view of male bursa.

Fig 6



*Galoncus tridentatus*, sp. n. Lateral view of male bursa and spicules.

The male bursa is divided into three lobes. The dorsal lobe is smaller and shorter than the lateral lobes. The

whole bursa is broader than it is long. It is 0.3 mm. in length and 0.5 mm. in breadth. The ventral ray is bifid, and arises separately from the lateral ray. The three branches of the lateral ray diverge widely from each other. The dorso-lateral ray separates at a higher level than the other two rays. The externo-dorsal ray arises in common with the dorsal. It ends a little distance away from the edge of the bursa. The dorsal ray is 0.18 mm. in length. It divides near its termination. Each of its two divisions has a tridigitate end like the serration of a saw (fig. 5).

The genital cone has a blunt apex. It does not protrude freely into the cavity of the bursa.

The two spicules are equal and similar in shape. They are very long and slender, being 1.9 mm. in length. They are curved in part of their course. Their termination is filiform, and apparently the two spicules are united at their tip. There is an accessory piece 0.04 mm. in length (fig. 6).

The posterior end of the female was not secured entire. The tail is short, and the vulva lies in the posterior third of the body. The female is oviparous. The ova are  $72\mu$  long and  $45\mu$  broad. They are voided in the unicellular stage.

*Habitat.* Submucous nodules in the small and large intestine of *Felis nebulosa* (leopard) from the Malay States.

#### PATHOLOGY.

The lumen of the intestine of the animal contained a large amount of mucus tinged with blood. The mucus surface of the large intestine especially was studded with hard nodules, about 1 cm. in diameter, projecting into the lumen. Their surface was covered with a thick layer of mucus. On being scraped the surface of the nodule was found to be smooth, with one or more minute openings at its apex. These were visible on account of the red-colour of the contents oozing from them. The nodules did not project on the serous surface of the intestine to the same extent. On section the hard tumour was found to be traversed with a convoluted canal tinged red with blood. The adult parasites lie along these tracts commonly two in each tumour. Microscopical examination of the contents of these canals revealed eggs and larvæ in different stages of development. Similar larvæ were found in the lumen of the gut. The extravasated blood was in the process of disintegration.

On examination of sections made from these tumours, the mucus membrane covering the tumour was found to be intact, but extremely atrophied, the tumour lying completely in the submucus tissue. The muscular layers of the

gut were slightly stretched over the tumour, and in some cases they were atrophied or disappeared completely, the tumour lying beneath the serous coat of the intestine.

In the case of *Galoncus perniciosus* from the tiger, the tumours have generally a cavity in which many worms lie coiled together. The parasites are thus much easier to secure entire.

In all the cases in which *G. perniciosus* was found, the death of the animal was ascribed to its presence. The amount of hæmorrhage is excessive, and, moreover, as Perry has shown, intestinal bacteria are enabled to reach the bloodstream along the tract made by the parasites and the animals die of septicæmia.

#### DISCUSSION.

This species is distinguished from *Galoncus perniciosus* principally by the presence of three pairs of ventral teeth. In *G. perniciosus* there are only two pairs. Moreover, the teeth in *G. perniciosus* project directly dorsalwards above the rim of the oral aperture. In *G. tridentatus* the teeth are directed towards the cavity of the mouth. The tridigitate terminations of the dorsal ray in *G. perniciosus* are longer and arise at different levels. In *G. tridentatus* they are less distinctly separate. In addition, the measurements of the other structures are different. In *G. perniciosus* the spicules are 2 mm. in length—that is, longer than in *G. tridentatus*.

It is evident that these parasites feed on blood extracted from the host and not on the mucus membrane. It is probable that the closely allied genus *Ancylostoma* also feeds on blood and not solely on the mucus membrane of the intestine.

The genus *Galoncus*, Raill. & Henry, 1918, was made to include *Ancylostoma perniciosus*, von Linstow, 1885. The type-species was first found in the tiger (*Felis tigris*). *Strongylus tubæformis*, Zeder, recorded from the domestic cat, resembles in many points *G. perniciosus*. It was never recorded again from the same host, and is generally labelled as an undeterminable species.

I am indebted to Prof. Leiper for the material examined and for advice during its study.

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LXXII.—*A new Davaineid Cestode*—Raillietina (Paroniella) macropa, sp. n., from a Wallaby. By R. J. ORTLEPP, M.A., Parasitologist to the Zoological Society of London \*.

#### SOURCE OF MATERIAL.

From the intestines of two Brunii's Wallabys—*Macropus brunii*,—which died in the Gardens of the London Zoological Society in November 1921, a number of cestodes were collected. One wallaby had only a single cestode, whereas the other had about half-a-dozen. The latter had been in the Gardens a few months longer than the former.

#### METHODS OF STUDY.

(a) *Preservation*.—Some of the cestodes which were required for sectionising were fixed in hot Schaudinn's

\* From the Helminthological Department, London School of Tropical Medicine.

solution for about a quarter of an hour, after which they were washed for a few hours in running water, and were then placed in 70 % alcohol to which a few drops of iodine solution were added. The addition of iodine was continued until the colour was permanent, after which it was poured off and replaced by 70 % alcohol, in which the animals were permanently preserved. The rest of the worms were placed in tap-water, and allowed to remain in it until they were completely relaxed and dead. They were then dropped into a preserving fluid, consisting of equal parts of pure glycerine, 70 % alcohol, and distilled water, and as this fluid became turbid it was replaced by fresh preservative. This preservative tends to keep the worms soft, and such specimens, after the excess of glycerine has been washed out by distilled water, are found to stain very well with Ehrlich's acid hæmatoxylin.

(b) *Study*.—Serial transverse and horizontal sections,  $7\mu$  thick, were cut of mature and ripe proglottids; these were stained with Ehrlich's acid hæmatoxylin with eosin as a counter stain. For the preparation of whole mounts, weak Ehrlich's acid hæmatoxylin was used, and the worms were allowed to stain overnight; they were then differentiated in acid alcohol and eventually blued in tap-water; after slightly pressing them between two microscopic slides and dehydrating them in this condition, the worms were finally mounted in Canada balsam. Acetic alum hæmatin and acetic acid carmine were also tried, but these stains did not give satisfactory results.

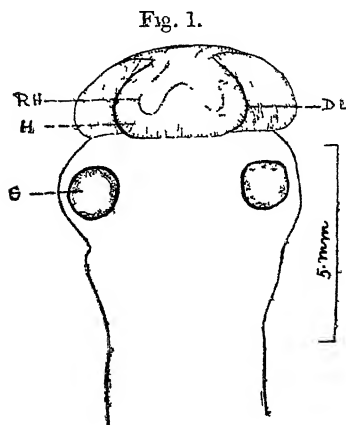
#### EXTERNAL CHARACTERS.

(a) *External Appearance*.—The specimens vary in length from 24 cms. to 35 cms. Anteriorly the body is very much attenuated, but posteriorly it gradually increases until about halfway down its length; here the maximum breadth—about 4 mm.—is attained; more posteriorly the strobila again becomes narrowed, so that at its hind end it is only about 1 mm. broad.

The anterior segments are very narrow, but they become slightly longer posteriorly, and in the middle of the body they are about one-tenth as long as they are broad. Towards the end of the body the segments decrease in breadth and increase in length, so that the terminal segments are about twice as long as they are broad, and somewhat barrel-shaped. The posterior lateral margin of each segment projects slightly over the segment following: this is more marked

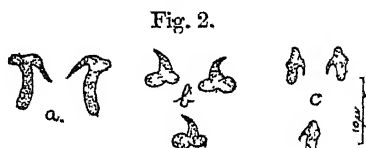
in the anterior half, where these projections give the outline of the strobila a finely serrated appearance.

(b) *Head*.—The scolex (fig. 1) is well developed, measuring across the suckers from  $580\mu$  to  $650\mu$  in breadth, with a length varying from about  $500\mu$  to  $600\mu$ . Its anterior portion forms a large and somewhat antero-posteriorly flattened protuberance; viewed from the anterior aspect this protuberance is roughly quadriradiate, each ray forming



Head.

*D.L.* = dorsal lobe of head protuberance; *H.* = hooks covering protuberance; *R.H.* = rostellar hooks; *S.* = sucker.



*a* = rostellar hooks; *b* = hooks from suckers; *c* = hooks covering the protuberance.

the axis of a bulb-like swelling, separated from its immediate neighbour on either side by a valley. These four lobes are situated one dorsal, one ventral, and two lateral.

Except for their median areas the whole surface of these lobes is covered by numerous minute hooks,  $5\mu$  to  $6\mu$  long (figs. 1 and 2 *c*)—these are arranged in longitudinal rows.

The anterior face of the protuberance is occupied by the rostellum, which is sunk into it. The rostellar hooks are of



the usual *Davainea* type (fig. 2 a), and are set in two rows, the hooks of the posterior row irregularly alternating with those of the anterior row. They are all of the same size, measuring about  $9\mu$  long. The crown formed by these hooks is very striking, in that they bound an area resembling that of an equal-armed cross, the extremity of each of whose arms is bifid. Each ray with its subdivisions occupies the middle area of one of the lobes of the protuberance, the four rays meeting on the anterior face of the protuberance. These hooks easily become detached, and consequently it was not possible to determine their number, but a rough estimation placed them at about 650 for each row.

The rest of the head, which is slightly broader than its anterior protuberance, is separated off from it by a well-defined constriction.

There are four rounded suckers placed on slight elevations, each elevation being situated opposite one of the depressions in the anterior head protuberance; thus they occupy a somewhat lateral position, two being subdorsal and two subventral. The outer margin of each sucker is beset with numerous small hooklets, about  $5\mu$  long (fig. 2 b), arranged in diagonal rows of about a dozen hooks in each row. The suckers are somewhat cup-shaped, measuring about  $130\mu$  across their mouths and having a depth of about  $70\mu$ .

(c) *Neck*.—A distinct neck is present, which is of a uniform breadth throughout its length. Its breadth, in different worms, varies from  $380\mu$  to  $417\mu$ , and its length varies from  $800\mu$  to  $1200\mu$ . This variation appears to be due to the different sizes of the worms, and also to different states of contraction.

(d) *Segments*.—The first-formed segments are very short, and are as broad as the neck, the older segments increase both in length and in breadth, until about the middle of the strobila is reached, where they are about  $230\mu$  long and 4 mm. broad. As the segments become ripe they increase in length and decrease in breadth, so that the ripe segments at the end of the body are about twice as long as broad, measuring about 2.5 mm. in length by 1.3 mm. in breadth.

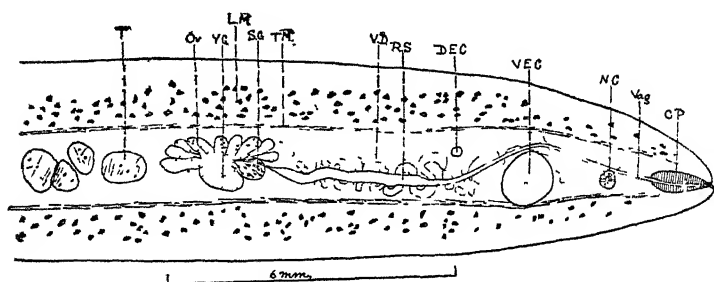
#### INTERNAL ANATOMY.

(a) *Muscular System* (fig. 3).—The longitudinal muscle-system is well developed, and consists of a single layer of irregularly scattered muscle-fibres occupying the dorsal and ventral thirds of the proglottid. The transverse muscle-fibres form a thin layer of delicate fibres immediately internal to the longitudinal muscle-fibres; they bound the

dorsal and ventral surfaces of the middle third of the segment, in which all the genital organs are confined. Dorso-ventral muscles were not observed.

(b) *Excretory System*.—The excretory system consists of two longitudinal vessels, dorsal and ventral, on either side towards the lateral margins of the segments. In the head region the corresponding vessels from each side unite and form a loop between the suckers. The ventral excretory vessels are large and thin-walled; they are more or less circular in transverse section, with a diameter of about  $110\mu$  in mature segments. In the hinder end of each segment a transverse duct,  $25\mu$  in diameter, connects the ventral vessels. The dorsal excretory vessels are much smaller, but

Fig. 3.



Transverse section of portion of mature segment, reconstructed from serial sections.

*C.P.* = cirrus-pouch; *D.E.C.* = dorsal excretory canal; *L.M.* = longitudinal muscle-layer; *N.C.* = nerve-cord; *Ov.* = ovary; *R.S.* = receptaculum seminis; *S.G.* = shell-gland; *T.* = testis; *T.M.* = transverse muscle-layer; *Vag.* = Vagina; *V.D.* = vas deferens; *V.E.C.* = ventral excretory canal; *Y.G.* = yolk-gland.

have a thicker and slightly muscular wall; they are situated at about the level of the dorsal margin of the ventral vessel, but more towards the interior of the segment. In transverse section they are circular with a diameter of  $15\mu$ . Like the ventral vessels they also are connected to each other by transverse vessels, situated one at the hinder end of each segment, and running parallel to, but dorsal of, those connecting the ventral vessels. Towards the posterior end of the strobila the lumen of the dorsal vessels may increase in diameter, so that in ripe segments they may attain about half the diameter of the ventral vessels.

(c) *Nervous System*.—The nervous system consists of two well-developed lateral nerve-trunks. In general, the paral

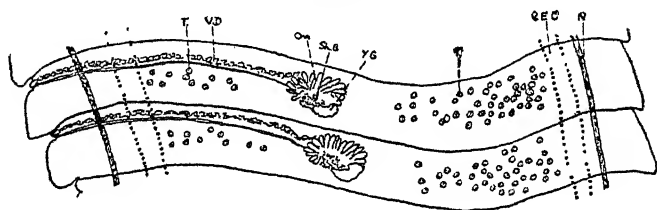
trunk is situated about midway between the ventral excretory vessel and the inner margin of the cirrus-pouch; it may, however, approach and lie close to the excretory vessel. On the aporal side the nerve-trunk lies in close proximity to the ventral excretory vessel. The course of the nerves in the head region was not followed.

(d) *Genital Organs* (figs. 3 and 4).—Each mature segment possesses one complete set of male and female genitalia, with their genital pores close together and unilateral in position.

These pores are in the anterior third of the segment, and are situated on a slight eminence. Each eminence is overhung by the projecting posterior angle of the segment preceding.

The genital rudiments of the ovaries are the first to appear

Fig. 4.



Mature segments, slightly flattened.  
(Magnification about 40.)

*N.* = nerve-cord; *Ov.* = ovary; *Sh.G.* = shell-gland; *T.* = testes; *V.D.* = vas deferens; *V.E.C.* = ventral excretory gland; *Y.G.* = yolk-gland.

about 8 mm. from the anterior end; some mms. further down the vagina begins to develop, to be soon followed by the vas deferens. The rudiments of the testes appear very much later, their first indications being at about 40 mm. from the anterior end. Mature segments are found about 5 mm. further down.

All the genitalia are confined to the central third of the parenchyma, being bound dorsally and ventrally by the thin sheet of transverse muscles and laterally by the ventral excretory canals.

The male organs consist of about 50 rounded testes, about  $65\mu$  in diameter, arranged in two groups separated by the ovary. The larger group, which consists of about three-fourths of the number of testes, is situated aporally. The testes do not pass laterally over the ventral excretory canal.

A fine duct, vas efferens, arises from each testis; these eventually unite together to form the large and much convoluted vas deferens. The vas deferens commences just dorsal of the ovary, and its convolutions fill up the space between the ovary and the ventral excretory vessel; having reached this vessel the vas deferens bends upwards, passing over and between it and the dorsal excretory vessel. It then again passes ventralwards and with a few convolutions passes dorsal of the nerve-trunk to join up with the cirrus. Throughout its whole course it is thin-walled with its lumen filled with spermatozoa. The cirrus is small, unarmed, and only feebly muscular; it is lodged inside the cirrus-pouch and its proximal portion may form one or two slight bends.

The cirrus-pouch is pyriform in shape, about  $100\mu$  long and  $40\mu$  broad at its proximal end. It has a weakly muscular wall, possessing only a thin layer of muscular fibres. Its opening is on the edge of the proglottid, on a slight bulging overhung by the free posterior angle of the segment preceding.

The ovary is situated in the middle of the segment. It consists of about 15 club-shaped lobules, radiating dorsally, anteriorly, and ventrally from their common centre. Its lateral diameter is about  $200\mu$ . A slight concavity in its posterior face is occupied by the shell and yolk glands. The yolk-gland, which is about one-fifth as large as the ovary, occupies a position aporally, while the shell-gland, which is about one-twelfth as large as the ovary, occupies a more or less similar position on the poral side of the ovary.

The vaginal aperture is situated immediately posterior to that of the cirrus-pouch; it passes straight inwards along the posterior edge of the cirrus-pouch to the dorsal surface of the ventral excretory canal. This distal portion of the vagina is thick-walled and muscular, having a very small lumen. On passing over the ventral excretory canal it bends obliquely inwards, passing between the dorsal and ventral excretory canals, and at the same time its wall becomes much thinner and its lumen much enlarged. The portion of the female duct from here to the ovary I take to be the receptaculum seminis, especially as it is in all mature segments filled with spermatozoa. The proximal portion of the receptaculum seminis bends obliquely upwards and passes into the ovary.

A functional uterus is not developed; the eggs when found become scattered about singly throughout the central body parenchyma, being limited laterally by the ventral excretory vessels and dorsally and ventrally by the transverse muscle-

## DISCUSSION.

Fuhrmann, in 1920, separated from the old genus *Davainea*, Bl., four new genera, limiting the genus *Davainea* to those small forms possessing a restricted number of segments (4-15), small suckers, feeble musculature, regularly alternating genital pores, and uterine capsules possessing only a single onchosphere. Three of his new genera comprise only four species, whereas his fourth—*Raillietina*—includes almost 90 species. This genus he characterises as follows:—“Cestodes à scolex arrondi surmonté d'un rostre de structure simple, armé d'une couronne double (rarement simple?) de crochets nombreux, petits et d'une forme spéciale. Ventouses plus ou moins arrondies, entourées de plusieurs rangées de petits crochets ou spicules, cadues ou persistant pendant toute la vie. Pores génitaux unilatéraux ou irrégulièrement alternes. Utérus manquant dans les proglottis mûrs; à sa place des capsules parenchymateuses renfermant une ou plusieurs onchosphères.”

He further subdivides the genus *Raillietina* into four subgenera, basing his differentiating characters on the position, unilateral or irregularly alternating, of the genital pores, and on the number of onchospheres, single or more, contained in each uterine capsule.

Referring the species described above to this new grouping of the Davaineas, it is seen that it belongs to the genus *Raillietina* and to its subgenus *Paroniella*. This subgenus is characterised by having unilateral genital pores and the uterine capsules contain only a single onchosphere.

From the available literature dealing with cestodes from Marsupials it appears that sixteen cestode genera have been recorded from this group of Mammals. These cestodes, together with *Raillietina* (*Paroniella*) *macropa*, sp. n., are practically all Cyclophyllids, only one genus—*Bothriocephalus*—belonging to another order, namely Pseudophyllidea. Of the Cyclophyllidean families all are represented except two—namely, the families Tetrabothriidæ and Mesocestoididæ.

I wish to express my indebtedness to the Zoological Society of London for the opportunity offered of collecting these parasites at their prosectorium. My thanks are also due to Mr. R. I. Pocock, F.R.S., for valuable assistance in the classification and nomenclature of the marsupial hosts.

The appended host list is an attempt towards the com-

reported from Marsupials. These have been arranged according to the families of the latter :—

# Suborder DIPROTODONTIA.

## Family Macropodidæ.

- Macropus agilis*, Gould.  
*Hepatotænia fellicola*, Nybelin, 1917.
- Macropus brunii*, Schreber.  
*Paroniella macropa*, sp. n.
- Macropus derbianus*, Gray.  
*Hepatotænia festiva* (Rud., 1819), Nybelin, 1917.  
 [Syn. *Moniezia festiva* (Rud., 1819), R. Bl., 1891.]
- Macropus dorsalis*, Gray.  
*Echinococcus granulosus* (Batsch, 1786), Rud., 1805.
- Macropus eugenii*, Desm.  
 [Syn. *M. thetidis*, Less.]  
*Echinococcus granulosus* (Batsch, 1786), Rud., 1805.
- Macropus giganteus*, Zimm.  
*Hepatotænia festiva* (Rud., 1819), Nybelin, 1917.  
*Echinococcus granulosus* (Batsch, 1786), Rud., 1805.
- Macropus robustus*, Gould.  
*Echinococcus granulosus* (Batsch, 1787), Rud., 1805.
- Macropus ulabatus*, Less & Garn.  
*Bancroftiella tenuis*, Johns., 1911.  
*Echinococcus granulosus* (Batsch, 1786), Rud., 1805.
- Macropus* sp.  
*Progamotænia zschokkei* (Janick, 1905), Nybelin, 1917.  
 [Syn. *Cittotænia zschokkei*, Janicki, 1905.]  
*Tænia* ? *kreffti* (Kreff, 1871), Johnst., 1909.  
 [Syn. *Bothriocephalus marginatus*, Krefft.]  
*Tænia mastersii*, Krefft, 1871.  
*Triplotænia mirabilis*, Boas, 1902.
- Lagorchestes conspicillatus*, Gould.  
*Progamotænia lagorchestis* (Lewis, 1914), Nybelin, 1917.  
 [Syn. *Cittotænia lagorchestis*, Lewis, 1914.]  
*Cittotænia villosa*, Lewis, 1914.
- Petrogale penicillata*, Gray.  
*Triplotænia mirabilis*, Boas, 1902.
- Onychogale unguifera*, Gould.  
*Hepatotænia festiva* (Rud., 1819), Nybelin, 1917.  
*Progamotænia bancrofti* (Johnston, 1913), Nybelin, 1917.  
 [Syn. *Cittotænia bancrofti*, Johnst., 1913.]

## Family Phalangeridæ.

- Phalanger ursinus*, Temm.  
*Bertiella edulis*, Zsch., 1898.  
*Bertiella sarasinorum*, Zsch., 1898.
- Pseudochirus lemuroides*, Collett.  
*Bertiella undulata*, Nybelin, 1917.  
*Bertiella pellucida*, Nybelin, 1917.  
*Parabertiella campanulata*, Nybelin, 1917.

- Pseudochirus herbertensis*, Collett.  
*Bertiella pseudochiri*, Nybelin, 1917.  
*Bertiella aberrata*, Nybelin, 1917.

- Trichosurus vulpecula*, Kerr.  
*Tænia phalangistæ*, Krefft, 1871.

- Trichosurus* sp.  
*Bertiella rigida*, Janicki, 1905.

Family **Phascolarctidæ**.

- Phascolarctus cinereus*, Goldf.  
*Bertiella obesa*, Zsch., 1898.  
*Tænia geophiloides*, Cobb., 1879.

Family **Phascolomyidæ**.

- Phascolomys ursinus*, Shaw.  
*Hepatotænia diaphana* (Zsch., 1907), Nybelin, 1917.  
 [Syn. *Moniezia diaphana*, Zsch., 1907.]  
*Phascolomys* sp.  
*Hepatotænia diaphana* (Zsch., 1907), Nybelin, 1917.  
 [Syns. *Tænia bipapillosa*, Leidy, 1875.  
*Moniezia festiva* (Rud., 1819), R. Bl., 1891.]

Suborder **POLYPROTODONTIA**.

Family **Peramelidæ**.

- Perameles macrura*, Gould.  
*Hymenolepis peramelidarum*, Nybelin, 1917.  
*Linstowia semoni* (Zsch., 1899), var. *acanthocirroa*, Nybelin,  
 [1917.]  
*Perameles nasuta*, Geoffr.  
*Linstowia semoni* (Zsch., 1896), Zsch., 1899.  
*Perameles obesula*, Shaw.  
*Linstowia echidnæ* (Thomp., 1893), Zsch., 1899.  
*Linstowia semoni* (Zsch., 1896), Zsch., 1899.

Family **Dasyuridæ**.

- Sarcophilus satanicus*, Thomas.  
 [Syn. *Dasyurus ursinus*, Harris.]  
*Anoplotaenia dasyuri*, Bedd., 1911.  
*Dasyurotænia robusta*, Bedd., 1912.  
*Thylacinus cynocephalus*, Harris.  
*Dithyridium* (*Piestocystis*) *cynocephali*, Ransom, 1907.

Family **Didelphyidæ**.

- Didelphys azaræ* (host cited as *Macropus azaræ*).  
*Bothriocephalus didelphidis*, Ariola, 1900.  
*Marmosa elegans*, Waterh.  
*Oochoristica bivittata*, Janicki, 1904.  
*Oochoristica didelphidis* (Rud., 1819), Zsch., 1904.  
*Oochoristica marmosæ*, Bedd., 1914.  
*Oochoristica murina*, Zsch., 1904.

*Peromys americana*, Mull.

[Syn. *Didelphys tristriata*, Illig.]

*Linstowia brasiliensis*, Janicki, 1904.

*Linstowia iheringi*, Zsch., 1904.

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LXXIII.—*On a Hermaphrodite Specimen of Amphioxus.*

By W. RIDDELL, M.A.

HERMAPHRODITISM in *Amphioxus* appears to have been noted previously on three occasions only. Langerhans\*, in 1876, recorded the presence of both ova and spermatozoa in all the gonads of a young individual; nothing quite comparable has been observed since. In 1912 Goodrich† gave a description of a specimen from Naples, in which one pouch on the left side contained ova, the remainder being filled with sperm. In 1914 Orton‡ described a similar specimen from Plymouth, again with one pouch on the left side containing ova. Goodrich does not seem to have made any histological examination of the gonads. Orton says that he examined a series of sections through the whole region. As he records no appearance of ova in any but the one pouch, it is to be presumed that the other gonads were normal.

The condition shown in the present example is much more complicated, but the material is unfortunately very scanty. Among a number of slides procured a short time ago from Messrs. Flatters and Garnett of Manchester for the Zoological Department of Queen's University, Belfast, was one which contained a series of sections of *Amphioxus*. Examination of this slide showed that one section exhibited both ovary and testis. I at once wrote to the makers for any information they could give concerning the specimen from which these section were made. Unhappily there was little to be learned. They stated that the specimen was probably one obtained from Naples ten or fifteen years ago; as the slides made from it differed somewhat from their usual type-series, they have only recently been sent out. No further information is available. I was able, however, to obtain from them sixteen other slides from this specimen. Thus this account is based on the examination of thirty-four sections from different regions, all showing hermaphroditism more or less marked. It is extremely unfortunate that more material is not available. The condition is more complicated than in those specimens described by Goodrich and Orton; but, though the sections are from different areas, it is impossible to say exactly what portions of the genital tract are covered by them. As shown by the size of the liver, they fall into two groups, one more anterior than the other; the

\* Archiv f. mikr. Anat. xii. 1876, p. 334.

† Anatom. Anz. xlii. (1912).

‡ Journ. Mar. Biol. Assoc. x. 3 (1914).

more posterior sections are the more markedly female. The depth of the sections varies from 5.7 to 6.3 mm., corresponding to a body-length of somewhere about 5 cm. probably. In spite of the scantiness of the material, these sections present several features of interest.

We may begin with such a section as that shown in fig. 1. At the first glance this appears to pass through an ordinary male pouch on either side. Closer examination shows that in no case are both these testes normal. There are always well-marked ova present in some portion of one or both gonads, sometimes clearly visible under even low power, but sometimes requiring a fairly high power to detect them, as when the ova are small or the section contains little but the nucleus more or less masked by the spermatozoa. Thus the upper border of the left-hand testis in fig. 1 shows a distinct ovum. None such is visible in the testis of the other side

Fig. 1.

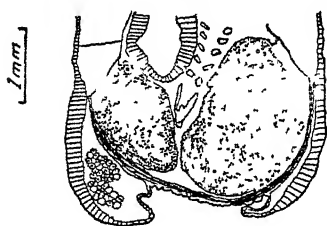
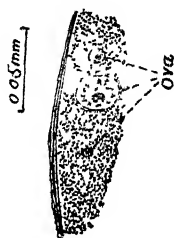


Fig. 2.



under this magnification, but examination of its inner border under a higher power reveals their presence (fig. 2). So far as I can determine, these ova, in such a case as the last, are to be looked for near the inner border of the gonad, dorsal to the vessel—that is to say, they occur in the region of the “Nabel”\* or hilum, the original place of attachment of the gonad.

Other sections show more complicated conditions. Fig. 3 represents a gonad where the main mass of the tissue is still male, but showing clear invasion by ova. In such a case as this the testis appears to be more or less broken up and invaded by strands of tissue, which carry the ova, in various stages of maturity, into its interior. A still more complicated condition is shown in fig. 4. Here the most of the gonad is

\* Neidert u. Leiber, “Geschl.-org. des *Amphioxus*,” Zool. Jahrb. (Anat.) xviii. 1903; Zarnik, “Geschl.-org. von *Amphioxus*,” Zool. Jahrb. (Anat.) xxi. 1905.

composed of ova in various stages of development, but there are still well-marked tracts of spermatozoa (*sp.*). There is only one section in the series which presents this appearance, and it is impossible to decide from it whether the original gonad was male or female or hermaphrodite. On the whole, the general appearance of the section is more female than male.

Fig. 3.

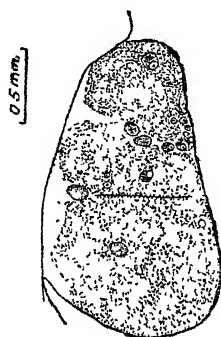


Fig. 4.

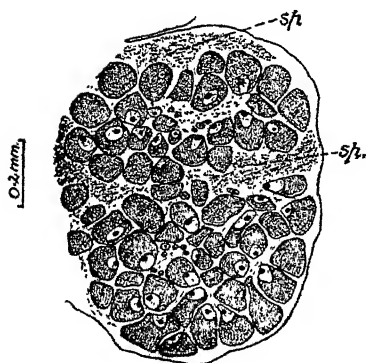
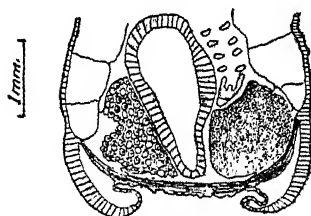


Fig. 5.

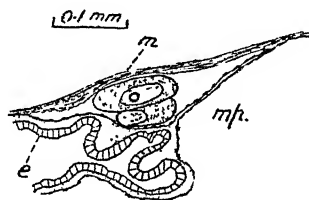


This leads on still further to the condition shown in fig. 5, where we have on one side an apparently normal ovary showing no trace of spermatozoa, on the other an almost normal testis, containing a distinct ovum, however, near the upper margin.

We have thus various gradations, leading from two almost

normal testes (showing, however, at least traces of ova) to one testis and one apparently normal ovary. It is to be regretted that there is not sufficient material available to enable us to decide whether this proceeded still further, to the presence of an ovary on either side. There are sections on the same slides as these which do show two ovaries, but, in the absence of any definite proof that these came from the Hermaphrodite specimen, they cannot be considered here. There are two other points about this specimen which may be noted. Some of the sections show a mass of ova in one metapleural space—the right (see fig. 1). That these were present in the original specimen is quite clear. There is no sign of tearing in the sections; ova are found in sections where no ovary is present, and occur in a mass closely resembling an ovary in structure, not a collection of separate ova, and are in various stages of development. The lymph-space in which they lie is greatly enlarged. Further, one or

Fig. 6.



*e.*, epidermis; *m.*, ventral muscle; *mp.*, metapleural space.

two sections show ova lying in one of the secondary lymph-spaces just internal to the main metapleural space (fig. 6). What the actual significance of this may be it is impossible to say in the absence of further evidence; but it seems to open up the possibility that there is something more in the condition than a mere change in the character of the gonads.

No other structural abnormality, such as the condition of the liver described by Orton, is to be seen in any of the sections.

As regards the question of parasites, one section alone shows any appearance of such. Here there are two oval or pear-shaped bodies lying beneath the epidermis at the point of insertion of one of the myotome septa into the body-wall; in the section the epidermis is broken at this point. These bodies measure about 115 by 90 microns; as they only appear in one section, and the stain used does not show up

their structure at all clearly, it is impossible to say anything as to their nature.

It is very difficult, knowing nothing as to the conditions of the gonads as a whole, to say what the meaning of the observed condition is. In the cases described by Goodrich and Orton, where the gonads were preponderatingly male, we naturally suspect that we are dealing with a condition of protandric hermaphroditism, though it is not impossible that the abnormal gonad was female from its first differentiation. On the whole, the balance of probability seems to me to be in favour of this view in this case also. There is much more male tissue present than female, and the condition of the testes which contain ova resembles rather that of an original male gonad which has been invaded by ovarian tissue than the reverse, the ova being apparently mainly young and having little or no appearance of degeneration. Any attempt at a theoretical interpretation is, I think, better avoided for the present, until we know more of the facts than we do now.

LXXIV.—*Metamynodon bugtiensis*, *sp. n.*, from the *Dera Bugti Deposits of Baluchistan*.—*Preliminary Notice*. By C. FORSTER COOPER, M.A., Superintendent of the University Museum of Zoology, Cambridge.

AMONG the fragments of numerous rhinoceroses found in the deposits of Dera Bugti in Baluchistan is a palate and two other fragments of a form which appears to be sufficiently different from the rest to be described as a new species.

The type-specimen is a palate with six teeth on each side, the last pair being just erupted from their alveoli.

The position of this animal depends somewhat on the correct interpretation of these teeth. If, as is the writer's belief, the last pair represent the third molars, then, from their shape, the specimen must be placed in the neighbourhood of the *Amynodonts*, with which genus it is provisionally placed, although further material, when found, may demand a new genus for its reception.

The reason for regarding these teeth as the third molars lies in the fact that they occupy all the available space at the back of the series, except for the very small area of the post-alveolar tuberosity. This area on each side, as well as the posterior border of the palate, is unbroken and in good condition. On one side the tuberosity has been sectioned,

and has shown no trace of a tooth, which, if present, must at least have appeared as a germ.

The three anterior teeth are presumed to be the premolars

Fig. 1.

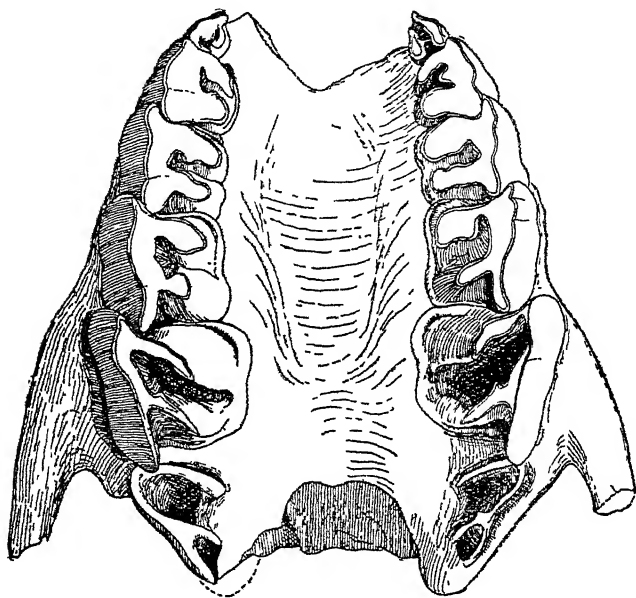


Fig. 2.

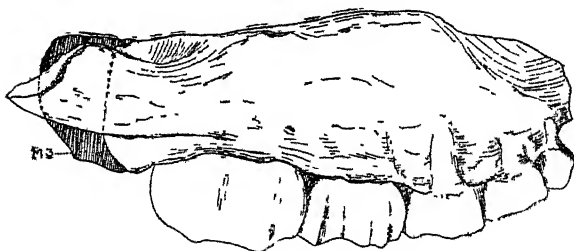


Fig. 1.—View of palate,  $\times \frac{1}{4}$ . The dotted line behind the last molar on the left (actual right) side shows the part of the alveolar tuberosity which has been sectioned.

Fig. 2.—Side view,  $\times \frac{1}{4}$ . M<sub>3</sub> marks the position of the third molar lying in its alveolus, from which it has partly been developed. The tooth is shaded dark to show its size.

2, 3, and 4. From the extent to which they are worn, the last premolar being rather more worn than the first molar, and from the fact that the last molar is only just appearing, they might reasonably be considered as milk-teeth. Fortunately, however, there are in the collection two other specimens of the three anterior teeth absolutely similar in size and shape, but one of them rather more and the other rather less worn than those of the type-specimen. These two specimens have been sectioned, and neither of them shows the slightest indication of any replacing teeth. Specimens of comparable age of other forms of rhinoceros from the same deposits show that the fourth premolar comes into full wear after the first three and at the same time as the third molar, and from this point of view the series might be read as four premolars and only two molars; but, if this were the case, the third molar should at least be ready to erupt, which shows that the reading of the last tooth of the series as the third molar is correct. It would appear further that, although the fourth premolar comes into use later than the first molar, and although for a period it shows less wear than the first molar, the wear soon equalizes, and then even reverses. This condition is clearly shown by a young adult specimen in the University Museum of *R. sumatrensis*, where the third molar is just touched by wear and the last premolar and first molar equally worn.

The specimen is broken away in front of the anterior teeth, but there is enough of the alveolar border remaining on one side to show that there was no tooth anterior to the series.

The assumption, therefore, that the teeth represent three premolars and three molars may be taken as being very probable. If this is the case, then the shape of the last molar prevents this form from being placed anywhere except in the neighbourhood of the genus *Amynodon*. The three molars consist of a simple protoloph and metaloph with strong protostyle and metastyle on the ectoloph, the metastyle on the third molar being as strongly marked as on the others. A small crochet is present on the metaloph of the second and third molars, but only towards the top, and would soon disappear in wear. This has happened on the first molar, if one was present. Of the premolars, the third and fourth are molariform. An internal cingulum is present and complete on the first two premolars and on the protoloph of the remaining teeth.

The length of the six teeth is 280 mm., of which the molar series takes 196 mm. The proportional lengths of the premolars and molars is thus not much different to those

given by Scott and Osborn for *Metamynodon*\*, but in the present specimen the teeth are less compressed antero-posteriorly and are more square in plan.

As nothing is as yet known of the form of the canines and incisors, the attribution of this species to the genus *Metamynodon* is tentative. Another Oriental species—*M. birmanensis*,—smaller than the present one, has been ascribed to this genus by Pilgrim†. It is, however, represented by very fragmentary remains, and seems to be as near to *Cadurcotherium* as to *Metamynodon*.

### LXXV.—*Some Remarks about Eastern Hedgehogs.*

By EINAR LÖNNBERG, F.M.Z.S. &c.

WHEN recently classifying some hedgehogs from Eastern Asia, the present author had the occasion to study more closely the literature of this group. Among other papers he also studied an early, but very valuable paper by Sundevall ("Öfversigt af släktet *Erinaceus*," K. Vet.-Akad. Handl. Stockholm, 1841).

In this the author quoted speaks about thirteen different species of hedgehogs, some of which he describes for the first time. These are arranged in two groups, and about them Sundevall expresses his opinion in the following terms: "The known species show such a great agreement in structure that they may be regarded to constitute a single indivisible genus; but, as, nevertheless, some of them, viz. those which in the following constitute the second section, evidently form a small, extremely natural, subordinate group, many naturalists, who love to make new genera, may consider that they ought to separate them as an independent genus, and I wish to their service propose to use for this group the name *Ericius*. It will, however, in such a case be necessary to separate generically in a similar way *E. æthiopicus* and *E. heterodactylus*, which differ as much from each other as from *E. auritus* and *europæus*."

From this it is apparent that Sundevall recognised that the hedgehogs, in spite of their general agreement, could be divided into certain groups. Only for one of these groups he proposed, although with a certain humour, *Ericius* as a name of subgeneric value, but at the same time he admitted

\* Scott and Osborn, Harvard Bulletin, vol. xiii. p. 169.

† Pilgrim and Cetter, Rec. Geol. Surv. India, vol. xlvii, part 1 (1916).



that this group may be regarded by other authors as a real genus. It is evident from his words that Sundevall considered *auritus* as the type of the *Eriacus* group, and if this one is taken as a genus or a subgenus this name must be used for the same. The other species, which Sundevall enumerates as belonging to the same, are *platyotis*, Sundevall, *ægyptius*, Geoffr., *hypomelas*, Brandt, *collaris*, Gray, *spatangus*, Bennett, and *dauricus*, Sundevall.

When accepting *Hemiechinus*, Fitzinger, 1866, as a genus among the hedgehogs, Satunin and others have also considered *auritus* as the type for the same, although, as Thomas in his recent review (Ann. & Mag. N. H. ser. 9, vol. i. 1918) points out, this name "is not included in Fitzinger's original paper." Thomas gains, however, the same result by selecting *platyotis*, Sundevall, as type for *Hemiechinus*, because it is found in Fitzinger's list, and by synonymizing in agreement with Anderson *platyotis* and *auritus*. As Sundevall already in 1841 proposed the name *Eriacus* for that group of hedgehogs to which *auritus* and *platyotis* belong, *Hemiechinus* is reduced to a synonym of the same. It is of interest to find that Sundevall refers to his *Eriacus* group, in addition to those already mentioned, mostly the same species as Thomas (*l. c.*) counts to *Hemiechinus*—viz. *collaris*, *grayi* (and the identical *spatangus*), and *dauricus*.

It is of interest as well to find that Sundevall also had recognised that his *heterodactylus* = *albiwentris*, Wagner, now referred by Thomas to the genus *Atelerix*, and his *æthiopicus*, now by Thomas referred to the genus *Paraechinus*, were so different *inter se* and from the others that they might be generically separated.

With regard to the supposed identity of *auritus*, Gm., and *platyotis*, Sundev., it must be remembered that this identification was done at a time when the geographic races were less studied and less valued than now. The present author has unfortunately no material of the true *auritus* for comparison, and can thus only judge with the aid of the literature, but according to that it appears little probable that the identification mentioned can be upheld according to modern views. "*Erinaceus auritus*" was, of course, from the beginning, a comprehension of all hedgehogs with large ears from Southern Russia, about Volga and all through Central Asia, and southwards to Transcaucasia, &c. By and by, from this heterogeneous mass, was split off *albulus*, Stoll., with its several subspecies in different parts of Central Asia. Later on (1901) Satunin proved that the hedgehog in the country around Mount Ararat was a different species, which

he named *caligoni*. In the same paper the author quoted says about *auritus* that "it does not go farther south than the Ust-Urt in the Transcaspiian province." He adds further "the distribution of *E. auritus* begins in the steppes of the Northern Caucasus, in the plains of the Manytsh; it then extends to the north between the Don and the Volga, up to the hillocks of Ergheni, and thence goes eastward through the Volga-Ural and the Kirghiz steppes approximately between 45° and 55° N. lat." The eastern boundary line he supposes to be at the Balkash-depression. In Persia another hedgehog (*persicus*, Satunin) is at home, and so on. It is then very difficult to believe that the real *auritus* should have another centre in Egypt. It appears thus most probable to the present writer that *platyotis*, Sundev., can defend its rank as a racial unit different from the Russian *auritus*.

The latter appears to be a larger animal, as Satunin records the length as amounting up to 210 mm.; while Sundevall gives the same dimension of *platyotis* as 165 mm. The skull of *auritus* has at least partly larger dimensions. The zygomatic width of the same being about 30-31, while it is 26-27 mm. in *platyotis*. Least postorbital breadth of the former 12-12.5 (*Satunin*), in the latter (Sundevall's type-specimens) 11-11.2 mm. Breadth across *m*<sup>1</sup> in the former 19-19.2 (*Satunin*), in the latter 16.5-17 (fide *Anderson* even 17.5). No doubt further direct comparisons of typical material will prove the distinctness of Sundevall's *platyotis*.

In connection with this, I take the opportunity of communicating some remarks on imperfectly or not at all known hedgehogs from Eastern Asia.

#### *Erinaceus dealbatus*, Swinhoe.

Three specimens from Mi-Yün-Hsien and two from Shun-I-Hsien, Niu-Lang-Shan, both localities in Chihli, Oct. 1920, presented by Professor J. G. Anderson to the R. Nat. Hist. Museum, Stockholm.

The original description of this hedgehog is very short and unsufficient, but, to judge from the locality, I think the identification must be correct. The median parting of the spines on the crown with a naked area between them is well visible both in the younger and older specimens. The latter are much lighter in their general colouring, because they have a great number of entirely white spines. The coloured ones are usually white at the base, then follows a very broad brownish ring, which, however, is not very well defined, but

gradually fading as well upwards as downwards. Above the same is a narrower ring of white or brownish white, and, finally, a short brownish tip. In some cases the broad brownish ring is so evanescent that the result is a white spine with a short brownish tip. In the smaller (younger) specimens the pure white spines are few, and among the others the brown rings are often darker and may reach down to the root of the spine. By this the general colour becomes darker. The length of the spines is about 18–21 mm. The hairs of the big specimens are white, a little greyish or brownish in the face. Ears short, rather broadly rounded, concealed in the fur, almost naked on the posterior side, sparingly beset with short brownish hairs on the inside. Length from lower outer angle to tip about 20 mm. The smaller specimens are brownish grey along the flanks below the spines, and also somewhat brownish in the face around the eyes and between them. The hairs on the feet are also somewhat brownish. The tail is very short, about 12 mm. The claws are pale horn-brown with whitish tips on the fore feet, a little darker on the hind feet. The length of the latter without claws is in the big specimens 35 mm. Length of head and body about 205 mm. (All measurements from alcoholic specimens.)

The claws of the fingers are much smaller than those of *Erinaceus europæus*, especially is this the case with those of the first, fourth, and fifth fingers. On the second and third hind toe the claws are not much smaller than in the Swedish hedgehog, but that of the fourth is plainly smaller, and this is still more the case with those of the fifth and first hind toes, the last of these latter sometimes almost looking rudimentary. The anterior plantar pads large and confluent, the two posterior also large and confluent only with a median groove, indicating their duplicity. The soles are somewhat rugose and there are also granular eminences, but few and only little defined. None of that kind is seen behind the posterior plantar pads.

The following cranial measurements from an adult male may prove of value for further comparison with other forms :—

	mm.
Greatest length of skull.....	51.
Condylar-basal length .....	51
Basal length .....	47
Zygomatic breadth .....	31
Mastoid breadth .....	25
Palate-length (from notch) .....	29
Length of nasals mesially along suture .....	15

	mm.
Greatest combined breadth of nasals .....	3
Interorbital width at <i>for. lacr.</i> .....	16.2
Least postorbital width .....	14
Width across premaxillaries .....	12.3
Width across outside of <i>m</i> <sup>1</sup> .....	20.5
Entire maxillary tooth-row .....	27.3

These measurements prove that *E. dealbatus* is considerably smaller with regard to cranial dimensions than the Common Hedgehog and the species which will be described below from Korea. From the former it differs also with regard to the transverse position of *m*<sup>3</sup>. There is a rather broad shelf behind the transverse posterior ridge of the palate and also a median spine. *C* is double-rooted.

The sagittal crest is not very strong and does not encroach much on the frontals.

*Erinaceus koreanus*, sp. n.

One specimen from Chosen, Korea. (Type in R. Nat. Hist. Mus. Stockholm.)

The median parting on the crown is well pronounced, and leaves a rather broad naked area between the groups of spines. The line forming the anterior limit of the spines on the crown runs at an equal distance between eye and ear. The spines covering the head and nape are somewhat more slender than those of the body, and appear also to be more regularly directed backwards in one and the same direction than the former. Behind them there is a zone on the upper neck, in which the spines are arranged more irregularly crosswise and somewhat shorter, many being only about 15 mm. or even less, while the spines of the head and the back, as a rule, are about 20 mm. The spiny head-covering looks paler than that of the body, because many of the spines are wholly white and the others have in the upper third an indistinctly defined pale brownish ring, above this one a white ring, and finally a brownish tip. The spines of the body display the same pattern. There are many white spines as well, but those annelated with brown have the rings more deeply coloured and some of them are also brownish at the root as well. All taken together this hedgehog looks, however, very pale compared with the European one. The naked area above the snout is much longer than the breadth of the rhinarium. The hairs above the same are rusty whitish, becoming more white in the middle of the face, but above and below the orbits brown hairs are more numerous than the white mixed in. The fore head in front of the real spines is beset with long and bristly—or, perhaps better, spinous—hairs, which are brownish

white. The sides of the neck to above the shoulders are covered with very long bristly hairs, white with a somewhat rusty tint. On the whiskers the colour deepens and shades into cinnamon and then rapidly into "tawny" (*Ridgway*, 1912) or "fawn" (*Rép. de Couleur*, 308·2), which colour occupies the lower surface from the chin to the breast, then the colour becomes lighter and shades on the middle of the belly to "cinnamon-buff" (*Ridgway*) and almost to whitish towards the flanks and anal region. The fore feet are a little more cinnamon than "sayal-brown," darker towards the hands. The hind legs and feet are very similar to *Ridgway's* "snuff-brown."

The ears are beset with brownish hairs on the margin, white inside. Total length of the preserved dry specimen 24 cm.; tail about 28 mm.; hind foot (s. u.) 39 mm.; ear about 26 mm. The claws have about the same development as in the Common Hedgehog, and are not reduced on the first and fifth toes in such a way as in *Erinaceus dealbatus*. The Korea Hedgehog has larger feet than the last-mentioned, and the posterior plantar pads seem to be less confluent.

	mm.
Greatest length of skull.....	56
Condyl-basal length.....	56
Basal length.....	52·6
Zygomatic breadth.....	36·4
Mastoid breadth.....	27
Palate-length (from notch).....	31
Length of nasals mesially along suture.....	12·7
Greatest combined breadth of nasals.....	3·3
Interorbital width at <i>for. lacr.</i> .....	17·5
Least postorbital width.....	13
Width across premaxillaries.....	13
Width across outside of <i>m</i> <sup>1</sup> .....	22·5
Entire maxillary tooth-row.....	27·4

The specimen is an old male with rather strongly worn teeth. The sagittal crest is strongly developed and extends forward over the posterior half of the frontals. The ante-orbital crest is well developed, especially above *for. lacrymale*. The nasals are very short mesially, but extend laterally as slender processes forward along the premaxillary for some distance, so that by this the naso-premaxillary suture becomes as long as the naso-maxillary and naso-frontal sutures together. The nasals do not reach further backwards than to the level of *foramina lacrymalia*. The premaxillary terminates rather broadly behind. The nasal processes of the frontals very slender. *I*<sup>1</sup> very long and slender. *C* double-rooted. *M*<sup>3</sup> has a more transverse position than in the Common Hedgehog, but not so much as in *E. dealbatus*.

Pterygoid fossa narrow, only 3.5 mm. where it is broadest, hardly 3 mm. at posterior end. There is a rather broad shelf behind the transverse posterior ridge of the palate, but there is also a well-developed median spine (unlike in *E. orientalis*, Allen).

Geographically spoken, *Erinaceus orientalis*, Allen, 1903, and *E. ussuriensis*, Satunin, 1906, are perhaps the next neighbours to this hedgehog from Korea. The latter differs, however, very much with regard to the striking coloration of its lower side with its cinnamon and tawny shades, while *E. orientalis* is said to have the "ventral surface very pale yellowish," and *E. ussuriensis* is in the middle of breast and belly "greyish white," otherwise greyish brown with a mixture of white hairs. The shoulders of the latter appear to have the last-mentioned mixture of brown and white hairs, and in *E. orientalis* they are "pale greyish sandy brown," but in the Korea Hedgehog white. The skull of the latter is smaller than that of both the other species, and especially is the shortness of the nasals striking, and this depends as well on the shortness in front as on less extension backwards.

*Erinaceus chinensis*, Satunin, 1906, from Chingan, is, according to its author, covered on the lower side with "dichter weisser Wolle," and it is thus rather different from the Korea animal. The skull of the former is larger than that of the latter and, although the single type-specimen is said to be young, it had already longer nasals than the old specimen from Korea. Satunin expresses a suspicion that possibly his *chinensis* may prove identical with *dealbatus*. It is very difficult to form any definite opinion in this matter, but it does not appear very probable. Perhaps it is more related to *orientalis*.

The difference between the Korea Hedgehog and *E. dealbatus* is very great, not only with regard to the colour, but also with regard to the smallness of the claws of the latter. The cranial characteristics are also very different, *e. g.*, the difference in length of nasals.

*Ericius przewalskii*, Satunin.

1 ♀, 17. 8. 1920, Bank Tjaggan, Mongolia; 1 ♀, 17. 8. 1920, near Burtun Nor, Mongolia (*Professor Andersson coll.*).

Several names have been given to members of this genus (= *Hemiechinus*, Fitz.) found in Eastern Asia, *e. g.*, *dauricus*, Sundevall, 1841, *albulus alaschanicus*, Satunin, *przewalskii*, Satunin, 1907, and *miodon*, Thomas, 1908. Of these *albulus alaschanicus* is easy to exclude at once from the comparison with the present specimens, in consequence of its small size. The remaining three are much similar as well *inter se* as also

with the present specimens, and it is not easy to find out the distinguishing characteristics from the descriptions only.

Thomas's *miodon* from Shensi is perhaps to be excluded, because it has a smaller, especially shorter, skull. When describing it, the author quoted compared it chiefly with *E. dealbatus*, and as this belongs to another group (nowadays even another genus) the characteristics of *miodon* used to distinguish it from *dealbatus*, as, for instance, the small size of  $p^3$ , are shared also by the Mongolian Hedgehog, because it belongs to the same natural group.

The name *przewalskii* was given by Satunin to a hedgehog collected in "Nord-China?" The description of the same agrees very nearly with the present specimens as well with regard to the exterior features generally as also with regard to cranial dimensions (*cf.* below).

The general appearance has a certain resemblance with that of a European hedgehog, although a little paler, but on a closer examination it is widely different by reason of its very large ears, comparatively long tail, and absence of any bare median space between the spines of the crown. The spines are directed towards different sides, which partly may be due to the fact that they are curved, the curvature being most pronounced in their basal parts. The spines on the crown, which are decidedly more slender than those on the back, are also less curved. They are brown at their base in varying degree, then follows a white ring and again a dark brown or blackish ring, which occupies the greater part of the distal half. Outside this is a subapical white ring, and finally a short brownish tip. The length of the spines is about 21–23 mm. The hairs are not quite so coarse as in a Common Hedgehog, and not at all so bristly as in *E. koreanus*. The snout and the surroundings of the eyes are brownish grey, the forehead paler, almost brownish white. The long hairs on the sides of the neck above the shoulders and along the flanks are white, the shorter hairs somewhat greyish. The whole underside is dirty white, more woolly in the young one. The fore feet have a colour somewhat resembling "otter-brown" (Rép. de Coul. 3544), the hind feet a little darker and more brownish. The ears are fringed with hairs similar in colour to those on the fore feet, but almost naked on the outside, inside with white hairs.

The vibrissæ on the sides of the snout are rather well developed and black. The total length of the larger dry specimen is about 21 cm. The hind foot of the same (s. u.) is 41 mm. and the dry ear about 24 mm. It is, however, of course, very much shrunk, which is proved by the fact that the ear of the somewhat smaller alcoholic specimen is from

the notch to the tip 32 mm. The tail measures 25 mm. from vent.

The claws are long and strong. Those of the fore feet of the old specimen are truncate at the tip, evidently worn by digging. They are horny white, and their degree of development is about the same as in the Common Hedgehog, thus no incipient reduction anywhere as in *E. dealbatus*.

The plantar pads are distinct, not confluent. Between and behind them are numerous granular eminences.

The only real discrepancy between this and Satunin's description, as far as it goes, is that he says that the length of the ear is only 19 mm., but this may be explained by the fact that his type-specimen was mounted, and this organ may therefore have shrunk very much.

The following cranial measurements of the present old hedgehog from Mongolia agree on the whole with those of Satunin's specimen, so that they certainly do not prohibit an identification. On the other hand, there is not much difference between Satunin's measurements and those by Radde, which are referred to *dauricus*, Sundevall. It seems therefore hardly possible to tell, for the present, whether Satunin's *przewalskii* really differs from the same, and if they are synonymous Sundevall has half a century priority. In any case *przewalskii* cannot be more than a subspecies of *dauricus*:—

*Cranial Dimensions of the Hedgehog from Bank Tjaggan.*

	mm.
Greatest length .....	56
Condylar-basal length .....	55.5
Basal length .....	51.5
Zygomatic breadth .....	36.5
Mastoid breadth .....	29.3
From palatal notch to tip of premax. ....	31.5
Length of nasals mesially .....	13.3
Length of nasals diagonally .....	14.5
Interorbital width at <i>for. lacr.</i> .....	18.5
Least postorbital width .....	13.8
Width across premaxillaries .....	15.5
Width outside <i>m</i> <sup>2</sup> .....	24
Entire maxillary tooth-series .....	28.7
Greatest transverse diameter of <i>p</i> <sup>3</sup> .....	2
Transverse diameter of <i>m</i> <sup>1</sup> .....	6.3

The sagittal crest is low and not much developed, and it does not reach in front of *sutura coronalis*. The premaxillary is rather broad behind, but just at the nasal suture it is produced in a narrow tip, which on one side meets the nasal process from the frontal, on the other leaves a short contact between the nasal and the maxillary. The posterior end of the nasals reaches to the level through the *for. lacrymale*.



Since the above was written, I have had the pleasure of receiving from Professor J. G. Andersson another (alcoholic) specimen of *Ericius przewalskii* from Tabool, Mongolia. This one is a male, somewhat paler than the female, especially on the head. Its length from snout to vent is about 235 mm.; hind foot (s. u.) 43 mm.; tail 31 mm.; ear 33 mm. The cranial measurements are somewhat similar to those recorded above; the nasals are a little longer and on both sides in contact with the maxillaries. Although the specimen is old, the sagittal crest is only little developed.

## PROCEEDINGS OF LEARNED SOCIETIES.

## GEOLOGICAL SOCIETY.

January 4th, 1922.—Dr. G. T. Prior, F.R.S.,  
Vice-President, in the Chair.

The following communication was read:—

‘Shales-with-Beef, a Sequence in the Lower Lias of the Dorset Coast.’

Part I.—Stratigraphical. By William Dickson Lang,  
Sc D., F G S.

The Shales-with-Beef lie between Table Ledge below and the *Birch* Bed above, and consist of an upper 30 feet of brownish paper-shales with selenite, ‘beef,’ and limestone-nodules and lenticles; and a lower 40 feet of bluish conchoidal marls with indurated marl-beds, beef, and limestone-nodules and lenticles.

The following are the main palaeontological divisions —

Mio- deroceras. Arietites. Cymbites.	{	76 a.	<i>Birch</i> -tabular. <i>Microderoceras birch</i> <i>Arietites turneri</i> , <i>Xiphoceras</i> spp., <i>Cymbites</i>
		75 a.	<i>Birch</i> -nodular. <i>M. birch</i> , <i>Ar. platti</i> , and allied forms.
		74 h-w.	<i>Microderoceras</i> spp. and <i>Arietites</i> spp.
Arietites. Amioceras. Sulciferites [Spath].	{	74 e-g.	<i>Amioceras hartmanni</i> and allied forms.
		74 c-d.	<i>Ar. brooki</i> .
		70 f-74 b.	<i>Amioceras</i> spp., <i>Arietites</i> new spp., <i>Sulciferites</i> [Spath] spp.
Paramioceras [Spath]. Amioceras. Agassicerias.	{	70 a-e.	<i>Paramioceras</i> [Spath] <i>alemoi</i> and allied forms, <i>Amioceras</i> spp.
		62 a-69 c.	<i>Amioceras</i> spp., <i>Agassicerias</i> spp., but no <i>Ag. striatus</i> .
		55-61 b.	Do., but with <i>Agassicerias striatus</i> .
		53-54.	<i>Amioceras</i> , characteristic new species, and allied forms.

Part II.—Notes on the Ammonites. By Leonard Frank Spath,  
D.Sc., F.G.S.

The palæontological part contains descriptions of the genera of ammonites found in the Shales-with-Beef, and remarks on their classification and phylogeny. The following new genera are proposed:—*Pararnioceras*; genotype, the species to which specimen No. 2713, Coll. W. D. L., belongs, identified by the Author with *Ammonites alcinoe* Reynès (1879, pl. xxiii, fig. 10).

*Sulciferites*; genotype, the species to which specimen Brit. Mus. C. 16416 belongs, identified by the Author as *Ammonites sulcatus* J. Buckman (Pal. Univ. 1904, No. 39, fig. 2).

Part III.—Petrological Notes. By William Alfred Richardson,  
M.Sc., F.G.S.

The development, in some beds, of lamination by weathering is described, and the presence of barytes recorded. A study of the concretions leads to the following conclusions as to the sedimentary history of the beds:—

(1) During sedimentation, calcium carbonate gradually accumulated in solution in the waterlogged deposit.

(2) During the initial stages of desiccation and draining, a system of limestones and calcareous nodules was precipitated rhythmically.

(3) During the later stages of desiccation, veins of fibrous calcite were deposited at levels of low pressure. Cone-in-cone structure, found in these veins, is due to pressure operating during growth, partly by spreading the growing crystals and partly by setting up planes of shearing closely parallel to the cleavage of the fibres.

(4) The remaining solutions of calcium carbonate were ultimately deposited as a cementing material, on the final drying of the deposit.

January 18th, 1922.—Mr. R. D. Oldham, F.R.S.,  
President, in the Chair.

The following communications were read:—

1. 'Jurassic Plants from Ceylon.' By Prof. Albert Charles Seward, Sc.D., F.R.S., F.G.S., and R. E. Holtum, B.A.

The collection of plant-impressions described by the Authors was obtained by Mr. E. J. Wayland, from a shale resting upon Archæan rocks at Tabbowa in the North-Western Province of Ceylon. These are the first fossil plants recorded from that island. Of the six species determined five appear to be identical with plants described by Feistmantel from Jurassic rocks on the Madras coast; these are:—

*Cladophlebis reversa* (Feistmantel); *C. denticulata* (Brongniart).

*Tæniopteris spatulata* (McClellan).

*Araucarites cutchensis* (Feistmantel).

*Brachyphyllum mammillare* (Brongniart)

*Elatocladus plana* (Feistmantel)

The Ceylon plant-bearing beds coincide, both in the composition of the flora and in their relation to the older igneous rocks, with those of Midias

2 'The Carboniferous Limestone (Avonian) of Broadfield Down (Somerset)' By Frederick Stietton Wallis, M Sc, F G S

This area affords yet another proof of the application of Arthur Vaughan's system of zonal classification of the Avonian to districts other than the type section of the Avon Gorge, Clifton

Both lithologically and paleontologically the area holds an intermediate position, and forms a link, between the developments of the Bristol and the Mendip districts

A well-marked faunal assemblage ('Fossiliferous Level'), of no great vertical extent, is described from the top of  $S_1$ , and is shown to constitute in this area a very useful field determination of the datum-line between the  $S_1$  and  $S_2$  subzones

*Pustula elegans* (McCoy) is here for the first time recorded from the  $S_1$  subzone Subzones  $Z_1$  and  $D_1$ , hitherto unrecorded from this area, are shown to be present

February 22nd, 1922.—Prof. A. C. Seward, Sc D, F R S,  
President, in the Chair.

The following communications were read:—

1 'Description of a New Plesiosaur from the Weald Clay of Berwick (Sussex)' By Charles William Andrews, B A, D.Sc, F R S, F G S

The imperfect Plesiosaurian skeleton which forms the chief subject of the present paper was found in a large septarian nodule from the Weald Clay of Berwick (Sussex) The specimen was collected by Mr S Tooth, who has presented it to the British Museum The parts preserved are the posterior region of the skull, numerous cervical and dorsal vertebrae (some still articulated one with the other), the shoulder-girdle, and the humeri The pelvis and hind limbs are entirely wanting, as also are the distal portions of the fore paddles The bones lay mixed up, in the greatest confusion, in an intensely hard matrix, from which they have been, for the greater part, freed with consummate skill.

The skull is very imperfect it seems to resemble most closely the skull of *Plesiosaurus capensis* Andrews, from the Uitenhage Series of South Africa The cervical vertebrae are also very similar to those of the African species, having the central portion of the articular surfaces deeply cupped they are, moreover, interesting, on account of the presence in this region of well-developed inter-vertebral discs (? of calcified cartilage) between the successive centra The shoulder-girdle is in an almost perfect

condition, the bones being quite undistorted. The clavicular arch is large and well developed, being very similar in type to the clavicular arches of some Lower Liassic forms. It is suggested that the retention of this primitive condition in this, and perhaps in some other Wealden Plesiosaurs, may be the consequence of their comparatively-sheltered life in a fluvial or estuarine habitat. Similarly, in the case of the Platanistidæ among the Whales, analogous conditions of life seem to have led to the persistence of primitive characters.

It is proposed that this new species of Plesiosaur shall be made the type of a new genus, *Leptocleidus*, its specific name being *Leptocleidus superstes*.

The shoulder-girdles of two species of Lower Liassic Plesiosaurs are also described and figured, and the generic name *Eurycleidus* is suggested for these, the type-species being *Eurycleidus arcuatus* (Owen) from the Lower Lias of Street (Somerset).

2. 'The Carboniferous Rocks of the Deer-Lake District of Newfoundland.' By Thomas Landell-Mills, F.G.S., Arthur Smith Woodward, LL.D., F.R.S., Pres.L.S., F.G.S., and Albert Gilligan, D.Sc., B.Sc., F.G.S.

The Carboniferous rocks form a synclinal flexure with its longer axis trending north-east and south-west. Underlying these is a limestone series of undetermined age (but probably post-Cambrian and pre-Carboniferous), which rests on highly-folded gneisses and schists of Archæan age.

A thick mantle of Pleistocene deposits covers the whole region; but deeply-trenched valleys give good exposures of the Carboniferous rocks, and the following sequence has been determined:—

UPPER CARBONIFEROUS— 2000 feet +	{ The Humber Grit Series, consisting of alternating beds of conglomerates, grits, sandstones, and marls. (2) Upper or Grey Shales. (1) Lower or Red Shales.
LOWER CARBONIFEROUS— 4000 feet (about)	

Fishes and plant-remains occur abundantly at several horizons in the Lower Carboniferous shales, but no fossils have been found in the Upper Carboniferous.

The mineralogical constituents of these deposits show a remarkable resemblance to those making up rocks of similar age in the North of England. It is inferred that the deposits on either side of the Atlantic were derived from the same land-mass. The fish-remains from Deer Lake, described by Dr. A. Smith Woodward, are all fragmentary; but they seem to represent three species closely related to those found in the Lower Carboniferous of Scotland. A group of ribs with the caudal fin and scattered scales belongs to a Dipnoan fish, which may be referred to a new species of *Uronemus*. Some specimens of a Palæoniscid fish are sufficiently well preserved to show that they belong to a new species of *Elonichthys*. Other scattered Palæoniscid scales seem to belong to *Rhadinichthys*.

# THE ANNALS

## MAGAZINE OF NATURAL HISTORY.

[NINTH SERIES.]

No. 54. JUNE 1922.

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LXXVI.—*Descriptions of new Species of Staphylinidæ from the West Indies.* By MALCOLM CAMERON, M.B., R.N., F.E.S.

### PART II.

[Continued from p. 125.]

#### BOLITOCARINI.

##### 73. *Diestota puncticeps*, sp. n.

(Fauvel, *in litt.*)

Red, moderately shining; the base of the elytra reddish yellow, the rest infusate. Antennæ with the first three joints and the legs testaceous.

Length 1.75 mm.

Very similar to *D. brevicornis*, Shp.; the abdomen is, however, entirely red, the elytra in great part infusate leaving only the base reddish-yellow, and the puncturation of the fore-parts is less fine. Head with close, moderately fine, but superficial puncturation. Antennæ stout, the third joint shorter and more slender than the second, the fourth to the tenth transverse, the penultimate nearly three times as broad as long. Thorax transverse, the posterior angles obtuse, the disc usually with a transverse impression

before scutellum, and a median impressed line; puncturation fine and rather close, finely pubescent. Elytra distinctly longer and a little broader than the thorax, slightly transverse, closely and rather finely punctured and pubescent. Abdomen finely and moderately closely punctured, and pubescent in front, more sparingly behind.

♂. Eighth dorsal segment with six sharp spines, the lateral curved, the rest centrally placed, short and straight (the median and external sometimes united at the bases), and separated from the lateral ones by a semicircular notch.

Grenada (*H. H. Smith*). Type in the British Museum.

74. *Silusa diversicollis*, sp. n.

(Fauvel, *in litt.*)

Rufous, shining, the elytra sometimes more or less infusate; antennæ stout, the first three joints and the last bright testaceous; legs testaceous.

Length 2 mm.

Head red, broad, scarcely perceptibly and sparingly punctured and pubescent. Antennæ stout, the third joint shorter than the second, the fourth slightly longer than broad, the fifth to the tenth transverse, gradually increasing in breadth, the penultimate fully twice as broad as long, the eleventh oval-oblong, longer than the two preceding together. Thorax twice as broad as long, the sides rounded and more narrowed behind than in front, posterior angles completely rounded: finely and obsoletely but rather closely punctured and pubescent. Elytra broader than, and half as long again as, the thorax, transverse, finely but more distinctly punctured than the thorax and equally closely. Abdomen gradually narrowed, finely and sparingly punctured; pubescence yellow, rather long and stiff.

I am unable to find any external sexual distinction in this species.

St. Vincent, Grenada (*H. H. Smith*). Type in the British Museum.

75. *Silusa tenella*, sp. n.

(Fauvel, *in litt.*)

Narrow, rufous, not very shining; the first two and the last joints of the antennæ testaceous; legs testaceous.

Length 1.5 mm.

A small slender red species with nearly parallel abdomen,

much less transverse, less shining, and obsoletely punctate thorax, which is, however, very finely coriaceous.

Head smaller than the thorax, greasy-lustrous, impunctate, finely and closely coriaceous. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, gradually increasing in width, the penultimate twice as broad as long. Thorax one-third as broad again as long, the sides, gently rounded in front, almost straight and more contracted behind to the rounded posterior angles, the disc rather broadly impressed: very finely, obsoletely, and rather closely punctured and finely and distinctly coriaceous, finely pubescent. Elytra a little longer and broader than the thorax, slightly transverse, the puncturation very similar to that of the thorax, but the ground-sculpture not so distinct; the surface therefore rather more shining. Abdomen very finely and sparingly punctured and pubescent, especially behind.

A single specimen.

St. Vincent (*H. H. Smith*). Type in the British Museum.

76. *Placusa insularis*, sp. n.

(Fauvel, *in litt*)

Narrow, elongate, black or pitchy, slightly shining; elytra brownish-testaceous, the abdomen more or less lighter at base and apex. Thorax distinctly more narrowed in front than behind; the first three joints of the antennæ and legs testaceous.

Length 2 mm.

Somewhat similar in build to *P. tachyporoides*, Walk., but much smaller and narrower and the antennæ stouter.

Head finely and pretty closely punctured. Antennæ with the third joint a little shorter than the second, the fourth smaller, as long as broad, the fifth to the tenth transverse, gradually increasing in width, the penultimate two and a half times as broad as long, the eleventh stout, as long as the two preceding together. Thorax scarcely half as broad again as long, as wide at the base (which is broadly but only slightly sinuate on either side) as the elytra at the shoulders, the posterior angles rounded, the sides gradually rounded and contracted in front; puncturation very fine and rather close, finely pubescent. Elytra as long as, and a little broader than, the thorax, transversely, finely, and pretty closely punctured and pubescent. Abdomen gradually pointed, very finely and closely punctured on the first three segments, more sparingly posteriorly.

Sexual differences unknown.

St. Vincent (*H. H. Smith*). Type in the British Museum.

77. *Placusa heterogaster*, sp. n.(Fauvel, *in litt.*)

Narrow, elongate, black or pitchy, shining; elytra brownish-testaceous, the abdomen more or less lighter at the base. Thorax with the sides evenly rounded, a little narrower at the base than the elytra at the shoulders, not more narrowed in front than behind, the base not sinuate. First three joints of the antennæ and the legs testaceous.

Length 1.5–1.8 mm

Smaller than the preceding species, more shining, and the thorax differently formed. Head finely and pretty closely punctured, finely pubescent. Antennæ as in the preceding species. Thorax transverse, one-third as broad again as long, the posterior angles rounded, very finely and pretty closely punctured and pubescent. Elytra as long as but broader than the thorax, transverse, very finely and pretty closely punctured and pubescent. Abdomen very slightly narrowed behind, very finely and pretty closely punctured and pubescent, scarcely more sparingly punctured behind than in front.

♂. Eighth dorsal segment narrowed, the middle of the posterior margin with a shallow emargination.

St. Vincent (*H. H. Smith*). Type in the British Museum.

78. *Placusa analis*, sp. n.(Fauvel, *in litt.*)

Narrow, elongate, black or pitchy, greasy-shining; elytra dark, the abdomen with base and apex rufo-testaceous. Thorax with the sides evenly rounded, a little narrower at the base than the elytra at the shoulders, not more narrowed in front than behind, the base not sinuate. First three joints of the antennæ and the legs testaceous.

Length 1.5–1.8 mm.

Size and build of the preceding, but differently coloured and less shining, the thorax usually broadly impressed on the disc, and with different ♂-characters.

♂. Seventh dorsal segment with a minute tubercle on either side of the middle line in front of the posterior margin; eighth with a larger pointed tubercle on either side of the middle line in front of the posterior margin which is furnished with three stout teeth of equal length, the lateral ones more robust than the median one.

St. Vincent (*H. H. Smith*). Type in the British Museum.



79. *Placusa luctuosa*, sp. n.(Fauvel, *in litt.*)

Shining; the head black, the thorax, elytra, and abdomen pitch-brown, the base of the latter sometimes lighter. Antennæ with the first three joints testaceous. Legs testaceous.

Length 1.5 mm.

Distinct at once from the preceding species by the distinctly shining fore-parts. Build of *P. heterogaster*, but much more shining, rather narrower, with more closely punctured head and thorax, and with the penultimate joints of the antennæ rather more transverse.

♂. Eighth dorsal segment narrowed, the posterior margin with a semicircular emargination.

St. Vincent (*H. H. Smith*). Type in the British Museum.

80. *Brachychara aterrima*, sp. n.

(*Brachida aterrima*, Fauvel, *in litt.*)

Black, convex, shining, attenuated posteriorly; first three joints of the antennæ and legs testaceous.

Length 2.5 mm.

Of narrower build than *B. crassa*, Shp., with more distinct elytral sculpture and much closer puncturation of the abdomen.

Head impunctate; antennæ with the third joint shorter than the second, the fourth to the tenth transverse, gradually increasing in breadth, the eleventh short and stout. Thorax strongly transverse, convex, widest a little before the base (which is bisinuate), the sides strongly rounded and narrowed anteriorly, less strongly rounded posteriorly, the posterior angles rounded; disc on either side with two moderate punctures, one a little before the base, the other at the anterior margin, and otherwise finely and sparingly punctured; pubescence sparing, rather short and stiff. Elytra as long as and slightly broader than the thorax, transverse, with a fine aciculate and distinctly squamulose sculpture; pubescence as on the thorax. Abdomen attenuated posteriorly, the third and fourth segments with very fine and sparing squamulose sculpture, the fifth to the seventh with moderately close and moderately coarse puncturation.

♂. Eighth dorsal segment narrowed and tuberculate, the lateral margins furnished on either side with a lightly

incurved pointed spine; the posterior margin on either side of the middle line, with a much shorter and finer straight spine.

St. Vincent (*H. H. Smith*). Type in the British Museum.

### GYROPHLENA, Mannerh.

The following table may help to facilitate the determination of the West-Indian species so far as known:—

- |   |                                     |
|---|-------------------------------------|
| 1. Antennæ at least slightly infusate towards the apex, in most species distinctly darker than the base . . . . .   | 2.                                  |
| Antennæ entirely clear testaceous yellow . . . . .  | 8                                   |
| 2. Thorax with four large punctures placed quadrately on the disc; species dark . .   | 3.                                  |
| Thorax without four large punctures on the disc . . . . .   | 4.                                  |
| 3. Sculpture of elytra granular . . . . .   | <i>guassa</i> , Shp.                |
| Elytra finely and sparingly punctured . .   | (83) <i>connexa</i> , sp. n.        |
| 4. Penultimate joints of the antennæ transverse . . . . .   | 5.                                  |
| Penultimate joints of the antennæ not transverse, disc of thorax exceedingly finely and very sparingly punctured . .  | (82) <i>granifera</i> , sp. n.      |
| 5. Intermediate and posterior legs more or less infusate . . . . .  | 6.                                  |
| All the legs clear yellow testaceous . . .  | 7.                                  |
| 6. Middle of disc of thorax finely and sparingly punctured; penultimate joints of the antennæ more transverse .   | (81) <i>obscuripes</i> , sp. n.     |
| Middle of disc of thorax impunctate; penultimate joints of antennæ less transverse . . . . .  | (84) <i>sparsepunctata</i> , sp. n. |
| 7. Species brightly coloured; the thorax and greater part of the abdomen reddish-testaceous. Antennæ only slightly infusate . . . . .                           | (93) <i>densata</i> , sp. n.        |
| Species dark; pitchy-black or brown, the thorax at most with the sides obscurely lighter, the abdomen at most with the extreme base and apex obscurely lighter. | (85) <i>jamaicensis</i> , sp. n.    |
| 8. Species brightly coloured; sculpture of elytra never granular . . . . .  | 9.                                  |
| Species dark; sculpture of elytra granular in some species . . . . .  | 13.                                 |
| 9. Species minute; length less than 1 mm.   | (96) <i>puncta</i> , sp. n.         |
| Species larger . . . . .  | 10.                                 |
| 10. Penultimate joints of the antennæ three times as broad as long . . . . .  | (94) <i>rufula</i> , sp. n.         |
| Penultimate joints of the antennæ at most twice as broad as long . . . . .  | 11.                                 |
| 11. Thorax exceedingly finely and sparingly punctured throughout . . . . .  | (92) <i>lavata</i> , sp. n.         |
| Thorax with impunctate disc . . . . .   | 12.                                 |

- 12 Thorax bright reddish yellow species  
 Inlet (2.3 mm) (87) *smithi*, sp. n.  
 Thorax pitchy red species smaller  
 (1.5-2 mm) (88) *picicollis*, sp. n.
- 13 Head and thorax with metallic bronze-green reflex  
 Head and thorax without metallic reflex 14  
 (86) *aneicollis*, sp. n.
- 14 Elytra finely and sparsely punctured in both sexes 15  
 Elytra coarsely punctured at least in ♂ 16
- 15 Species narrower and less robust Antennæ 1  
 Species broader and more robust Antennæ 2  
 (95) *atomaria*, sp. n.
- 16 Fifth joint of the antennæ strongly transverse (the penultimate joints about three times longer than broad) (91) *hydrocephala*, sp. n.  
 Fifth joint of the antennæ scarcely transverse (the penultimate joint twice as broad as long) (89) *faurei*  
 (90) *pusillus*, spp. n.

81. *Gyröphæna* (sensu) *obscuripes*, sp. n.

Black or pitchy-black, shining; the elytra dark brown. Antennæ with the first three joints testaceous, the anterior pair of legs testaceous, the intermediate and posterior pairs infusate. Thorax irregularly and finely punctured. Elytra exceedingly finely and exceedingly sparingly punctured.

Length 1.6 mm

In build resembling *G. lucidula*, Er., allied to *G. sparse-punctata*, mhi, from which it differs at once in the stouter antennæ, differently punctured thorax, and the ♂-characters.

Head with a few fine punctures at the sides. Antennæ with the fourth to the tenth joints transverse, but only slightly so and not differing much between themselves from the fifth. Thorax very finely and very sparingly punctured, the sides impunctate and without ground-sculpture. Elytra exceedingly finely and exceedingly sparingly punctured, ground-sculpture transversely stitigose. Abdomen nearly impunctate, the fifth to the seventh segments strongly coriaceous.

♂. Eighth dorsal segment narrowed, the apex broadly rounded, with two lightly curved and strongly raised keels throughout its length, the space between these closely and finely asperate.

Jamaica. Type in my collection.

82. *Gyrophæna* (s. str.) *granifera*, sp. n.

Castaneous brown or red, shining; the thoracic margins narrowly testaceous; the elytra blackish posteriorly, more or less testaceous in front. Antennæ with the first three joints testaceous, the penultimate joints as long as broad. Legs testaceous.

Length 1.75–2 mm.

Size and build of *G. affinis*, Sahlb.

Head with a few fine punctures on either side; ground-sculpture obsolete, transversely strigose. Antennæ with the fifth to the tenth joints as long as broad, scarcely differing amongst themselves. Thorax on either side of the middle before the base with a moderately large puncture; the sides nearly impunctate; ground-sculpture as on the head. Elytra exceedingly finely and sparingly punctured, in the ♂ with a group of eight or nine granules in the postero-internal angle also. Abdomen nearly impunctate.

♂. Elytra with eight or nine granules in the postero-internal angle: seventh dorsal segment with a tubercle in the middle a little in front of the posterior border; eighth narrowed, trilobed, the median lobe rounded, the lateral dentiform, the separating emargination acute.

Jamaica. Type in my collection.

83. *Gyrophæna* (s. str.) *connexa*, sp. n.

(Fauvel, in litt.)

Shining black or pitchy-black, robust. Thorax with four large quadrately placed punctures on the disc, the anterior pair immediately behind the anterior border, the posterior pair well in front of the posterior border, the sides practically impunctate. Antennæ with the first four joints and the legs testaceous.

Length 1.3 mm. (not extended).

About the size and build of *G. manca*, Er., and allied to *G. æneicollis*, m.

Head very broad, practically impunctate. Antennæ with the third joint shorter than the second, the fourth small, transverse, the fifth and sixth much larger, scarcely transverse, the seventh to the tenth slightly transverse. Thorax as above. Elytra very finely and very sparingly punctured. Abdomen nearly impunctate.

♂ unknown.

Grenada (*H. H. Smith*). Type in the British Museum.

84. *Gyrophæna* (s. str.) *sparsepunctata*, sp. n.

Black, shining; the humeral angles of the elytra sometimes obscurely testaceous. Thorax without dorsal row of larger punctures. Elytra exceedingly finely, scarcely perceptibly, and very sparingly punctured. Antennæ with the first three joints testaceous, the fifth joint square, the penultimate scarcely transverse. Legs testaceous, the intermediate and posterior fu-co-testaceous.

Length 1.3–1.5 mm.

Build resembling *G. lucidula*, Er. Allied to *G. jamaicensis*, m., but differing in the more slender antennæ and the much finer puncturation of the elytra.

Head transverse, with three or four small punctures on either side near the eyes, very finely coriaceous. Antennæ rather slender, the third joint a little shorter than the second, the fourth small, transverse, the fifth larger, square, the following scarcely transverse and differing but little amongst themselves, the eleventh as long as the two preceding together. Thorax with a small puncture on either side of the middle before the base, another near the posterior angles, and two or three on the sides; ground-sculpture coriaceous, but indistinct. Elytra exceedingly finely and exceedingly sparingly punctured; ground-sculpture distinct, coriaceous. Abdomen distinctly coriaceous, nearly impunctate.

♂. Eighth dorsal segment with stout triangular tooth on either side, the posterior border deeply excised internally on either side forming a median central lobe, the broadly rounded apex of which extends a little beyond the level of the lateral teeth.

Jamaica. Type in my collection.

85. *Gyrophæna* (s. str.) *jamaicensis*, sp. n.

Black, shining; the base of the elytra narrowly testaceous. Thorax very finely, irregularly, and sparingly punctured. Elytra with sparing granular sculpture. First three joints of the antennæ and legs testaceous.

Length 1.3–1.5 mm.

Build of *G. lucidula*, Er. Allied to *G. sparsepunctata* and *obscuripes*, m., from both of which it is readily distinguished by the entirely testaceous legs.

Head with a few small punctures at the sides, the vertex impunctate. Antennæ with the fourth to the tenth joints transverse, the penultimate twice as broad as long. Thorax

with a few small scattered punctures on either side of the disc, the middle of which and the sides impunctate. Elytra with sculpture consisting of small scattered granules. Abdomen nearly impunctate.

♂. Seventh dorsal segment with minute tubercle on either side of the middle a little in front of the posterior margin; eighth dorsal segment with the lateral margin produced into a curved, rather short, sharp tooth, the posterior margin deeply excised internal to this, in the middle forming a triangular lobe with apex broadly rounded and not extending beyond the level of the lateral teeth.

Jamaica. Type in my collection.

86. *Gyrophæna* (s. str.) *æneicollis*, sp. n.

(Fauvel, *in litt.*)

Robust, black, shining; the head and thorax with greenish-bronze reflex; the elytra dark brown. Abdomen sometimes obscurely lighter at the base. Thorax with four punctures on the disc. Antennæ stout, entirely testaceous. Legs testaceous.

Length 1.5 mm.

A small robust dark species of about the build of *G. poveri*, Crotch, and allied to *G. piceicollis*, m., in general facies but differently coloured.

Head broad, scarcely perceptibly and very sparingly punctured. Antennæ short and stout, the third joint shorter and narrower than the second, the fourth small, transverse, the fifth much broader than the preceding, the penultimate fully three times as broad as long. Thorax with four small punctures on the disc, otherwise practically impunctate and with very obsolete, scarcely visible ground-sculpture. Elytra as long as but broader than the thorax, transverse, finely, obsoletely, and very sparingly punctured, with obsolete ground-sculpture. Abdomen exceedingly finely and very sparingly punctured, finely coriaceous.

♂. Sixth segment with four large tubercles placed transversely in front of the posterior border; seventh with a semicircular ridge (the convexity backwards) in the middle anterior to the posterior border; eighth triangularly produced, the apex rounded.

Grenada, St. Vincent (*H. H. Smith*). Type in the British Museum.

87 *Gyrophæna* (s. str.) *smithi*, sp. n.

(Fauvel, *in litt*)

Testaceous, shining, the head, elytra (except the shoulders and more or less of the base), and sixth segment of the abdomen black. Thorax with four punctures on the disc, elytra very sparingly punctured. Antennæ and legs entirely testaceous.

Length 2.3 mm

Coloration and build of *G. gracilicornis*, Shp., but smaller, the antennæ with the penultimate joints transverse and different ♂-characters.

Head transverse, black, impunctate. Antennæ with the second and third joints subequal, the fourth a trifle longer than broad, the fifth to the tenth transverse, gradually increasing in width, the penultimate about twice as broad as long. Thorax strongly transverse, the disc with four quadrately placed punctures and three or four others towards the lateral borders, otherwise impunctate and without ground-sculpture. Elytra transverse, dark, the shoulders and more or less of the base testaceous, finely and exceedingly sparingly punctured and without visible ground-sculpture. Abdomen gradually narrowed behind, exceedingly finely and very sparingly punctured.

♂. Postero-external angles of the elytra carinate (often obsolete), the posterior border near the suture with an obsolete tubercle, eighth dorsal segment with posterior margin furnished with a stout, short, incurved tooth on either side, and deeply bisinuate between.

Grenada, St. Vincent (*H. H. Smith*). Type in the British Museum.

88. *Gyrophæna* (s. str.) *piceicollis*, sp. n.

(Fauvel, *in litt*)

Rufo-testaceous, shining, the elytra testaceous yellow, the postero-external angles and more or less of the posterior margins infuscate, abdomen with the sixth segment infuscate. Antennæ and legs testaceous.

Length 1.5 to 2 mm

Build of *G. æneicollis*, m., but on the average a little larger and entirely differently coloured.

Head (sometimes dark reddish brown) with a row of three rather large punctures on either side and two smaller on each side near the eyes; ground-sculpture very fine.

and strigose. Antennæ much more slender than in the preceding, with less transverse penultimate joints. Thorax with four quadrately placed punctures on the disc and another on each side on the anterior border, otherwise practically impunctate; ground-sculpture scarcely visible, the disc more or less infuscate. Elytra very finely and very sparingly punctured, and with scarcely visible ground-sculpture. Abdomen almost impunctate, ground-sculpture coriaceous.

♂. Eighth dorsal segment narrowed, the lateral margin on either side produced into a short, sharp, slightly incurved tooth, the posterior border between the teeth broadly emarginate.

Grenada (*H. H. Smith*). Type in the British Museum.

89. *Gyrophæna* (s. str.) *fauveli*, sp. n.

(*flavicornis*, Fauvel, in litt.)

Shining, pitchy black or brown; the elytra and abdomen sometimes obscurely lighter at the base; thorax very obsoletely and sparingly punctured on either side. Sculpture of the elytra granular. Antennæ and legs testaceous.

Length 1 to 1.5 mm.

Allied to *G. varians*, Shp., but the antennæ shorter with more strongly transverse penultimate joints.

♂. Head nearly impunctate, moderately broad, and without visible ground-sculpture. Antennæ with the fifth joint scarcely transverse, the sixth to the tenth transverse, gradually increasing in breadth, the penultimate twice as broad as long. Thorax very obsoletely punctured towards the sides and without ground-sculpture. Elytra transverse, studded with moderately large and moderately close granules. Abdomen nearly impunctate.

Eighth dorsal segment on either side furnished with a long, straight, inwardly directed spine; the posterior margin deeply emarginate internal to the spines, and produced and gradually narrowed in the middle, forming a roundly pointed lobe, not extending back quite so far as the apex of the spines.

♀ unknown.

St. Vincent (*H. H. Smith*). Type in the British Museum.

90. *Gyrophæna* (s. str.) *persimilis*, sp. n.

Exceedingly similar to the preceding, but appears to be



on the average a little narrower; the ♂-characters are, however, very different, and appear to ally it with *G. varians*, Shp., from Central America—it differs from this species in the stouter antennæ.

♂. Sixth dorsal segment on either side of the middle line at the posterior margin with a sharp-pointed spine projecting a short distance over the following segment, but sometimes obsolete. Eighth dorsal segment gradually narrowed and produced into a lobe, the apex of which is emarginate.

♀ unknown.

St. Vincent (*H. H. Smith*). Type in the British Museum.

91. *Gyrophæna* (s. str.) *hydrocephala*, sp. n.

(Fauvel, *in litt*)

Pitchy, shining; the elytra and base of the abdomen obscure brownish testaceous. Thorax exceedingly finely and sparingly punctured, without series of larger punctures. Elytra (in the ♂) distinctly but sparingly granular, in the ♀ less distinctly. Antennæ stout, with the legs entirely testaceous.

Length 1 mm.

A small robust species, with large head and stout antennæ. Head broad, practically impunctate. Antennæ with the fourth to the tenth joints transverse, gradually increasing in breadth, the penultimate three times as broad as long. Thorax finely, obsoletely, and sparingly punctured.

Elytra with moderately close granular sculpture (especially towards the centre) in the ♂, finely and sparingly asperate in the ♀.

Abdomen nearly impunctate.

♂. Seventh dorsal segment with a sharply pointed oblique tubercle or spine on either side of the middle line and well in front of the posterior margin; eighth dorsal segment with a small sharp tooth on either side. The posterior margin broadly rounded in the middle and separated from the lateral teeth by a deep rounded excision.

Grenada, St. Vincent (*H. H. Smith*). Type in the British Museum.

92. *Gyrophæna* (s. str.) *laxata*, sp. n.

(Fauvel, *in litt*.)

Rufo-testaceous, shining; the posterior two-thirds of the elytra and the sixth abdominal segment more or less infus-

cate; thorax exceedingly finely and sparingly punctured, without dorsal series of larger punctures. Antennæ and legs testaceous.

Length 1.5 mm.

A small, brightly coloured species, somewhat similar to *G. minima*, Er., in build. Head impunctate, finely coriaceous. Antennæ with the first joint small, the fifth to the tenth transverse, gradually increasing in breadth, the penultimate twice as broad as long. Thorax exceedingly finely and sparingly punctured all over, obsolete transversely strigose. Elytra scarcely longer, but a little broader than the thorax, exceedingly finely and rather sparingly punctured. Abdomen practically impunctate.

♂. Seventh dorsal segment in front of the posterior border with two closely approximate small tubercles; the eighth narrowed and produced, emarginate at the extremity, the lateral borders forming on either side a short, stout, blunt tooth.

St. Vincent (*H. H. Smith*). Type in the British Museum.

93. *Gyrophæna* (s. str.) *densata*, sp. n.

(Fauvel, *in litt.*)

Colour of the preceding, but rather broader and more depressed; the antennæ less stout and slightly infusate towards the apex, and the elytra much more closely punctured.

♂. Eighth dorsal segment narrowed and rounded at the apex; the disc with a pair of longitudinal, closely approximated costæ or folds, extending from about the middle to the apex.

St. Vincent (*H. H. Smith*). Type in the British Museum.

94. *Gyrophæna* (s. str.) *rufula*, sp. n.

(Fauvel, *in litt.*)

Shining rufo-testaceous; the elytra, except for the shoulders and base, more or less infusate; abdomen with the fifth, sixth, and seventh segments more or less darker. Antennæ and legs testaceous.

Length 1.3 mm.

Smaller than *G. piceicollis*, m., but somewhat similarly coloured and very distinct by the much stouter antennæ.

Head very broad, exceedingly finely, scarcely perceptibly, and very sparingly punctured. Antennæ with the fourth

joint smaller than the fifth, transverse, the fifth to the tenth strongly transverse, the penultimate fully three times as broad as long. Thorax without quadrately placed punctures on the disc, the sides presenting only a few very obsolete and scattered punctures. Elytra exceedingly finely and exceedingly sparingly punctured, very finely coriaceous. Abdomen practically impunctate.

♂. Seventh dorsal segment with two small tubercles before the posterior margin; eighth narrowed, the lateral margin on either side produced into a short, sharp, incurved tooth, the posterior border between the teeth broadly emarginate.

Grenada (*H. H. Smith*). Type in the British Museum.

95. *Gyrophæna* (s. str.) *atomaria*, sp. n.

(Fauvel, *in litt*)

Minute, black or pitchy; elytra sometimes brown. Thorax very finely and very sparingly punctured, without dorsal series of larger punctures. Elytra finely, sparingly, and asperately punctured. Antennæ and legs testaceous.

Length 1 mm.

Head impunctate. Antennæ stout, the penultimate joints three times as broad as long. Thorax very finely, sparingly, and irregularly punctured. Elytra finely, sparingly, and asperately punctured. Abdomen practically impunctate.

♂. Seventh dorsal segment a little in front of the posterior border with a pair of small tubercles, one on either side of the middle line; eighth dorsal segment narrowed and produced, the apex rounded.

St. Vincent, Grenada (*H. H. Smith*); Haiti. Type in the British Museum.

96. *Gyrophæna* (s. str.) *puncta*, sp. n.

Reddish testaceous, shining; the elytra testaceous, infusate at the postero-external angles; abdomen sometimes infusate on the sixth segment. Antennæ and legs pale testaceous.

Length .75 mm.

Smaller and narrower than *G. atomaria*, m., and of brighter coloration; the thorax also with a dorsal row of three very fine punctures on either side. Head impunctate and without visible ground-sculpture. Antennæ stout, the

fourth to the tenth joints strongly transverse. Thorax with a dorsal row of three fine punctures on either side of the disc, and one or two externally, no visible ground-sculpture. Elytra very finely and very sparingly punctured. Abdomen nearly impunctate.

♂. Seventh dorsal segment in front of the posterior border with a small tubercle on either side of the middle line; eighth dorsal segment produced and narrowed, the apex rounded.

Haiti. Type in my collection.

97. *Euvira insularis*, sp. n.

(Fauvel, *in litt*)

Narrow, elongate, black, shining. Antennæ stout, the first eight joints and the legs reddish testaceous; femora infusate.

Length 2 mm.

About the size and build of *E. minuta*, Shp., and with the antennæ similarly constructed; the puncturation is, however, less coarse everywhere.

Head transversely quadrate, the temples a little prominent; the eyes large, their diameter greater than the length of the temples; puncturation moderately coarse and moderately close. Antennæ with the third joint shorter than the second, the fourth small, the fifth much broader, transverse, the sixth to the tenth transverse, gradually increasing in breadth, the penultimate two and a half times broader than long. Thorax convex, narrower in front than behind, the posterior angles rounded, the sides gradually narrowed and rounded anteriorly; sculpture rather finer than that of the head. Elytra fully half as long again as, and considerably broader than, the thorax, with finer puncturation. Abdomen parallel, very finely and moderately closely punctured throughout.

♂ unknown.

St. Vincent (*H. H. Smith*). Type in the British Museum.

THECTURELLA, gen. nov.

Mandibles lightly curved, pointed, the right with a small sharp tooth about the middle of the inner border, which is crenulate anterior to this structure, the left without tooth, but similarly crenulate. Maxillary palpi 4-jointed, the first very small, the second lightly curved and a little dilated towards apex, the third narrow at the base, gradually

enlarged to the apex, broader than the preceding joint at the extremity, the fourth very small, subulate. Inner lobe of maxilla narrow and pointed, furnished with four or five moderately long, but slender pectinations; outer lobe very similar in size and shape to the inner one, the apex ciliate. Tongue rather short, but longer than broad, split nearly to the base into two narrow lobes, reaching the level of the apex of the first joint of the labial palpi. Labial palpi 3-jointed, the first joint rather short and stout (about twice as long as broad), the second much narrower and shorter than the first, the third cylindrical, about three times longer than the preceding. Gular sutures long and parallel. Temples not bordered below. Prosternum broadly rounded behind. Mesosternal process narrow and pointed, extending about half the length of the intermediate coxæ, which are very narrowly separated. Tarsi 4, 4, 5, the anterior pair with the first three joints short and subequal; the intermediate with the first three joints rather short and subequal, the fourth as long as the three preceding together; posterior pair with the first three joints rather short and subequal, the fourth yet shorter, the fifth as long as the two preceding together. Elytra not sinuate.

This genus is evidently closely allied to *Thecturita*, Casey, which it resembles in the parallel, rather depressed build, large head, unbordered temples, etc.; but differs in the bifid tongue and the different proportions of the joints of the labial palpi. Appears to differ from *Oligurota*, Cas., by the bifid tongue, shorter head, small eyes, etc.

98. *Thecturella insidiosa*, sp. n.

(*Homalota insidiosa*, Fauvel, in litt.)

Minute, parallel, subdepressed, rather shining, dark chestnut-brown; the elytra testaceous; the abdomen black, shining, the apex testaceous. Antennæ and legs testaceous. Length 1.1 mm.

Head large, quadrate, nearly as wide as the thorax, deeply sulcate longitudinally in the middle, very finely and moderately closely punctured at the sides, the sulcus impunctate; eyes small, their diameter much less than the length of the temples. Antennæ rather short, the third joint much shorter than the second, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate two and a half times broader than long. Thorax slightly transverse, widest a little before the middle, the sides scarcely rounded in front, quite straight, and but feebly narrowed behind to

the rounded posterior angles, exceedingly finely and moderately closely punctured; pubescence sparing, rather coarse. Elytra a little longer and broader than the thorax, square; extremely finely and closely punctured. Abdomen exceedingly finely and moderately closely punctured on the first three visible segments, more sparingly behind, finely and sparingly pubescent.

St. Vincent (*H. H. Smith*). Type in the British Museum.

#### MYLLÆNINI.

##### 99. *Myllæna celerrima*, sp. n.

(*M. oxypodina*, Fauvel, *in litt.*)

Subopaque, pitchy brown; the thorax and abdomen reddish brown with apex lighter. Antennæ with all the joints longer than broad, fusco-testaceous. Abdomen sericeous.

Length 2.2 mm.

Very similar to *M. mollis*, Shp., with which it agrees in the build and the antennal structure; the abdomen, however, in the present species is much more densely punctured and pubescent. Head extremely finely and densely punctured and finely pubescent. Antennæ with the third joint a little shorter than the second, the fourth to the tenth all longer than broad, from the fifth to the ninth differing but little between themselves, and about twice as long as broad, the tenth a little stouter, eleventh longer than the tenth. Thorax transverse, widest about the middle, the sides more narrowed in front than behind, the posterior angles obtuse, exceedingly finely and densely punctured and pubescent. Elytra as long as the thorax, transverse, with similar sculpture and pubescence as on the fore-parts. Abdomen attenuated posteriorly, sericeous, exceedingly densely and finely punctured.

Grenada, St. Vincent (*H. H. Smith*). Type in the British Museum.

##### 100. *Myllæna diversicornis*, sp. n.

(Fauvel, *in litt.*)

Subopaque, pitchy brown; the thorax and abdomen reddish brown, the apex lighter. Antennæ with all the joints longer than broad, entirely testaceous. Legs testaceous. Abdomen sericeous.

Length 2 mm.

Differs only from the preceding in the smaller and definitely narrower build and entirely testaceous antennæ.

Grenada, St. Vincent (*H. H. Smith*). Type in the British Museum.

101. *Myllæna curticornis*, sp. n.  
(Fauvel, *in litt.*)

Subopaque, pitchy brown; the thorax and abdomen reddish, the apex lighter. Antennæ with all the joints longer than broad, the intermediate infusate. Abdomen finely and closely punctured and pubescent, not sericeous.

Length 1.3 mm.

Differs from the preceding, which it resembles in coloration and build, by the much smaller size, shorter antennæ, and less densely punctured and pubescent abdomen, which is not sericeous and is more setose at the sides.

Grenada (*H. H. Smith*). Type in the British Museum.

102. *Myllæna indefatigabilis*, sp. n.

Subopaque; head and abdomen black; thorax and elytra pitchy; densely and very finely punctured, sericeous. Antennæ obscure testaceous, the first eight joints longer than broad, the ninth and tenth scarcely longer than broad.

Length 2 mm.

Size and build of *M. infusata*, Kr., but less shining, with pitchy thorax and elytra, much more densely punctured, and lighter antennæ, which, however, are similarly constructed. Legs testaceous.

St. Lucia. Type in my collection.

103. *Myllæna difficilis*, sp. n.

Subopaque, pitchy black, sericeous. Antennæ with the first two joints and the last obscurely testaceous, the rest infusate, all longer than broad. Legs testaceous.

Length 2.5 mm.

In build similar to *M. diversicornis*, m., but entirely pitch-black, and with dark antennæ, which, however, are similarly constructed. A slender fragile species.

Jamaica. Type in my collection.

104. *Myllæna obscura*, sp. n.

Subopaque, pitchy black, sericeous. Antennæ with the first two joints obscure testaceous. Legs testaceous.

Length 2 mm.

Size of *M. indefatigabilis*, m., but broader and less fragile. The antennæ longer, the ninth and tenth joints slightly,

but definitely, longer than broad, and the sculpture throughout, though equally dense, is not quite so fine.

Haiti. Type in my collection.

105. *Myllæna granulata*, sp. n.

Pitchy brown or black, subopaque. Antennæ brown, all the joints longer than broad. Legs testaceous.

Length 1.75 mm.

Build of *M. mollis*, Shp., but smaller, and with more slender antennæ, which otherwise are similarly constructed.

Head, thorax, and elytra densely and finely granular, no definite puncturation being visible, very closely and finely pubescent. Abdomen densely and finely coriaceous, very closely and finely pubescent, sericeous.

Jamaica. Type in my collection.

PRONOMÆINI.

106. *Pronomæa debilis*, sp. n.

Narrow, elongate, rather shining, black; the elytra brownish red; the apex of the abdomen more or less testaceous or pitchy testaceous. Antennæ with the first three joints reddish testaceous. Legs testaceous.

Length 2.5 mm.

This is a narrower and much more densely punctured species than *P. rostrata*, Er., the base of the first four visible abdominal segments being also closely and coarsely punctured.

Head moderately strongly and pretty closely punctured. Antennæ with the second and third joints of equal length, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate about one and a half times broader than long, the eleventh conical, about as long as the two preceding together. Thorax transverse, the posterior angles obtuse, less coarsely, but more densely punctured than the head, the base sometimes obscurely impressed before the scutellum, the middle of the disc sometimes with faint longitudinal impressed line. Elytra as long as, but scarcely broader than, the thorax, transverse, rather finely, closely, and asperately punctured.

Abdomen a little narrowed behind, more shining than the fore-parts, the base of the first four visible segments closely and rather coarsely punctured, the rest of their surface and the other segments finely and very sparingly punctured.

Jamaica. Type in my collection.

[To be continued.]



LXXVII.—The "*Cirripede*" *Lepidocoleus* in the Upper Ordovician Rocks of Scotland. By THOMAS H. WITHERS, F.G.S.

[Plate X. figs. 1-5.]

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THE acquisition by the Geological Department of the British Museum of the well-known collection of Mrs. Robt. Gray, of Edinburgh, has brought to notice certain small fossils, which were included with the Annelida, since they are the specimens which Dr. Cowper Reed (1908, p. 295, pl. xii. figs. 9, 10) described and figured as an Annelidan Tube (?), allied to *Cornulites* and *Conchicolites*.

Examination of these specimens shows, without any doubt, that they represent a species of the genus *Lepidocoleus*, a form which is generally accepted as belonging to the Cirripedia.

The genus *Lepidocoleus* is known by several species (Withers, 1915, pp. 121-2) from the Ordovician, Silurian, and Devonian rocks of Europe and North America, but so far it has not been recorded, as such, from the Palæozoic rocks of this country. We now have, however, the present specimens from the Ordovician of Scotland, and the genus is represented in the English Silurian by species occurring in the Wenlock beds of Dudley and Malvern.

Genus *LEPIDOCOLEUS*, Faber.

The shell of this genus is composed of two columns of plates, square to oblong in shape, and these combine to form a blade-shaped shell, which opens along the sharp "free" margin, and along the broad "fixed" margin there is a narrow median groove formed between the incurved and rounded margins of the plates; at the apex the shell tapers to a point, and although it also tapers slightly towards the base, it is there somewhat broadly rounded; the plates overlap each other from behind forwards, sometimes to as much as half their length. In some species the plates of each column alternate with each other to some extent, but in others there is a little or no alternation. The umbo of each plate is apical and is situated on the outer edge of the median groove at the "fixed" margin, and there each plate is rather abruptly deflected inwards, but in the plates of the left-hand series this deflected portion is slightly wider, and bent outwards

slightly near the inner margin, to fit under the inturned margins of the plates of the right-hand series, thus forming a kind of hinge (see Pl. X. fig. 4). In consequence of the tapering of the shell at each extremity, the plates vary somewhat in shape according to their position in the shell, but there is also much difference in the shape of the plates, their number, and ornament, in the different species. On the inner surface of each plate of the two columns, near the middle, there is a well-marked sub-circular muscle-scar.

*Genotype*.—*L. jamesi* (Hall & Whitfield).

*Lepidocoleus grayæ*, sp. n. (Pl. X. figs. 1-5.)

1908. Annelidan Tube (?), Cowper Reed, Geol. Mag. dec. v. vol. v. p. 295, pl. xii. figs. 9, 10.

*Diagnosis*.—A *Lepidocoleus* with more than 16 plates in a column, a length of more than 25 mm., and a breadth of 5 mm.; plates overlapping to almost half their length, mostly about twice as wide as long, with an ornament of comparatively wide-spaced growth-ridges, about four to a millimetre, and of five to six very slightly finer ridges between each main ridge, giving the surface, where well-preserved, an exceedingly closely and regularly ridged appearance.

*Horizon and locality*.—Upper Ordovician, Lower Ardmillan series, Drumuck group, Mudstones: Thraive Glen, Girvan, Ayrshire.

*Collection*.—Geological Department of the British Museum (Mrs. Robt. Gray Coll.), registered In. 21648 and In. 21649.

*Holotype*.—The specimen (In. 21648) figured, Pl. X. figs. 1-4, which is presumably the specimen partly figured by Cowper Reed (1908, figs. 9, 10).

*Material*.—Two incomplete shells with the plates very little displaced.

*Description*.—One specimen (Pl. X. fig. 5) represents a shell, including the basal extremity; its length is 20.4 mm., and its greatest breadth 5.0 mm. This shell is bent or humped, with the result that the plates are somewhat telescoped and displaced; the shell-layer of the plates has been removed in places, so that only the impression remains. At least sixteen plates or their impressions can be counted in serial order, but, owing to the bad preservation, the form of the plate at the base cannot be made out, although the rounded shiny impression on the matrix leaves no doubt that this really is the rounded basal extremity. Both this

and the second shell show certain narrow longitudinal depressions, but these are evidently due to compression.

Another specimen (Pl. X. figs. 1-4) was in two pieces, which fitted together quite readily. The larger piece shows a column of eight plates and an impression of another plate, and this is presumably the specimen represented by Cowper Reed (1908, pl. xii. fig. 9) in an inverted position, although it is not easily recognised from the figure. The smaller piece, which consists of two columns, each of four plates, is evidently the third specimen mentioned by Cowper Reed. These two pieces, then, together comprise twelve plates and an impression of another in serial order, and these plates do not appear to have been displaced in any way, so the length of the shell, which measures 21.7 mm., is probably the correct length of the piece preserved, and its greatest breadth is 5.0 mm. On the other side of the shell the lowermost four plates are shown, but since they are much flattened, they do not show well on the broad "fixed" margin; but above these, in the middle of the specimen (Pl. X. fig. 2), the plates of the two series are seen to be in close apposition with little or no alternation. On this same side of the specimen, the lowermost three plates are broken away towards the narrow "free" margin, and, since the fourth plate is entire, one can measure the degree of overlap. The fourth plate has a breadth of 4.7 mm., and a length of 2.7 mm., and the third plate overlaps this to the extent of 1.2 mm., leaving 1.5 mm. exposed. The ornament of the plates consists of fine growth-ridges comparatively wide-spaced, numbering about four to a millimetre, and between these are from five to six slightly finer ridges, which give to the shell a peculiarly closely and regularly ridged appearance. Although the main ridges are clearly seen on both specimens, the finer ridges are well preserved only on this one, where they are very clearly shown on the lowermost four plates of the right-hand series; an enlarged view is given of the two lowest plates (Pl. X. fig. 3).

*Comparison with other species.*—*L. grayæ* is distinguished from other species by its exceedingly fine and numerous growth-ridges, but it would appear to differ also from the known Ordovician and Silurian species in the length of the shell and the number of plates. *L. grayæ* has at least sixteen plates to an incomplete shell, which would have measured at least 25 mm. *L. jamesi* (Hall & Whitfield), from the Hudson River Group (Ordovician) of Cincinnati, is said to have only fifteen plates in a complete shell, and this has only a length of about 12 mm., less than half

the length of *L. grayæ*. *L. sarlei*, J. M. Clarke, from the Niagara Shales (Silurian) of Rochester, New York, has thirteen plates to a complete shell, but this measures as much as 23 mm. *L. grayæ* would seem to be more nearly related to *L. squamatulus* (Barrande), from the Ordovician of Bohemia, and *L. suecicus*, Moberg, from the Upper Ordovician of Sweden—two species that appear to be very close indeed to each other. No shell approaching completeness is known of the two latter species, although a number of plates of *L. suecicus* have been found in association, but the plates would appear to be in many instances longer in proportion to their breadth than is the case in *L. grayæ*, and the growth-ridges number from 8–9 to a millimetre, but with no intervening and almost equally prominent ridges as in *L. grayæ*.

LXXVIII. — *An exceptionally complete Example of the Cirripede Scalpellum fossula, Darwin.* By THOMAS H. WITHERS, F.G.S.

[Plate X. fig. 6.]

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SOME years ago (1911, Geol. Mag. dec. v. vol. viii. p. 21), when describing certain Cirripedes in the collection of Dr. H. P. Blackmore, F.G.S., I mentioned that he had a beautiful example of the species *Scalpellum* (*Arcoscalpellum*) *fossula*, well worthy of description. Owing to its fragile nature, however, it was dangerous to risk sending this important fossil through the post, but since Dr. Blackmore has recently very generously presented it to the Geological Department of the British Museum (Registered In. 21559), it is now possible to proceed with its description and illustration.

While detached valves of this species are fairly common in the Upper Senonian, it is quite exceptional to find the valves in their natural association. Darwin (1851, Pal. Soc. Monogr. Foss. Lepadidæ, p. 24) described two specimens from the Chalk (*Belemnitella mucronata*-zone) of Norwich, each with four valves in position, one specimen consisting of the carina, scutum, tergum, and upper latus, and the other of a carina, scutum, tergum, and carinal latus. Dr. Blackmore's example from the Chalk (*Actinocamax quadratus*-zone) of East Harnham, near Salisbury, Wilts, consisting as it does of fourteen valves in the capitulum, together with some of the plates of the peduncle, is by far

the most complete specimen from the English Chalk. Only one other Arcoscalpellid is known so complete as this, and this is an example of the same species from the Chalk of Meudon, France, first described and figured by Hébert (1854, Bull. Soc. géol. France, 2<sup>e</sup> ser. tom. xi. p. 470, figs. 1-3) as *Scalpellum darwini*, and later (1855, Mém. Soc. géol. France, 2<sup>e</sup> ser. tom. v. p. 356, pl. xxviii. fig. 1) as *Scalpellum gallicum*. That specimen has just as many valves as Dr. Blackmore's example, for, while the rostrum is missing, there is a sub-carina. Taken together these two specimens show that the species had a capitulum consisting of fifteen valves, a like number to that deduced from a study of the isolated valves.

The specimen (Pl. X. fig. 6) has the left side uppermost and shows the carina (apex broken), scutum, tergum (apical part broken), upper latus, carinal latus, inframedian latus, and rostral latus. All these valves are in their natural position, except that the inframedian latus is pushed slightly upwards and over the rostral latus. Seven or eight peduncle-plates are present at the base of the capitulum; the uppermost three appear to retain their mutual relation, though pushed on to the inframedian latus. Below the peduncle-plates is seen the displaced rostral latus of the right side, showing its inner surface. The scutum of the right side is slightly displaced and its ad-occludent portion appears from beneath the edge of the left scutum, and inside this part of the right scutum rests the displaced rostrum.

Dr. Blackmore has not only carefully exposed all the plates as seen in the figure, but he has removed all the chalk, except for three pinnacles on which the capitulum rests, so that it is possible to examine the valves of the right side.

Much skill has been shown by Dr. Blackmore in the development of this fine fossil, and it is an exceedingly valuable addition to the National Collection.

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LXXIX.—*The Holotype of the Cirripede Scalpellum angustum (Dixon)*. By THOMAS H. WITHERS, F.G.S.

[Plate X. figs. 7, 8.]

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DIXON (1850, Geol. Sussex, p. 353, pl. xxviii. fig. 9) established the species *Xiphidium angustum* on a single small carinal valve from the Chalk of Sussex.

Darwin, in his Monograph (1851, Palæont. Soc. Monogr.

Foss. Lepadidæ, p. 37, pl. i. fig. 2), included the species in the genus *Scalpellum*, but, since he had not the holotype or other specimens before him, had to rely on Dixon's figure, which he reproduced.

The original of Dixon's *Xiphidium angustum* was not in the Dixon Collection, now in the Geological Department of the British Museum, and, in spite of several attempts to trace the specimen, it was not till recently, when on a casual visit to the Brighton Museum, that I noticed it on exhibition there. It was then found that the specimen was mentioned in H. Willett's Catalogue (1871, Cat. Cret. Foss. Brighton Mus. p. 45, No. 35), with a reference to Dixon's pl. xxviii. fig. 9, together with the locality and horizon, "m.c. [= Middle Chalk], Southeram, Lewes," which were otherwise unknown. Willett was a keen collector of Chalk Fossils, and several of his specimens were figured by Dixon, although in the present instance Dixon gave neither the locality nor collection.

There are two large quarries at Southeram—one, Southeram Grey Pit, cut in the Lower Chalk, zones of *A. varians* and *H. subglobosus* (Mem. Geol. Surv., Cretaceous Rocks of Gt. Britain, 1903, vol. ii. pp. 69, 70), and the other, Southeram Limekiln Quarry, cut in the Middle and Upper Chalk, zones of *R. cuvieri* to *M. cor-anguinum* (tom. cit. pp. 401, 402; vol. iii. 1904, pp. 46, 48). Judging from the chalk in which the specimen is embedded, and still more from the fact that Willett gives "m.c." [= Middle Chalk] as the horizon, there can be little doubt that it came from the second quarry, and either from the *R. cuvieri* or *Terebratulina*-zone.

The authorities of the Brighton Museum kindly allowed me to borrow the specimen, and since it agrees in measurements with Dixon's figure, and what is more important has the peculiarity that the intraparietes are broken off as indicated in the figure, there is no doubt that it is the type.

Darwin (1851, p. 38)—relying on the accuracy of J. de C. Sowerby's drawing (Dixon's pl. xxviii. fig. 9), which depicts the lower end of the intraparietes as abruptly and obliquely truncated, and also on the sharply pointed basal margin—believed the species to be new. Examination of the type, however, shows that the abrupt truncation of the intraparietes is due to the valve being broken across near the base of the intraparietes (see Pl. X. fig. 8). The valve is comparatively narrow, the tectum only moderately arched transversely, and on each side of the tectum there is a comparatively narrow but protuberant ridge; the parietes are

rather narrow and separated from the intraparietes by a ridge; the intraparietes are comparatively wide and form a thin wall on each side of the valve.

None of the characters shown by this valve of *S. angustum* seems to justify its separation from the species *S. angustatum* (Geinitz, 1843, Verstein. von Kieslingwalda, p. 7, pl. iv. fig. 10), which was based on a single carina from the Pläner-kalk of Strehlen, Saxony, but better figures of the carina, together with scuta and terga, were later given by Geinitz (1875, Palæontogr. Bd. xx. Abth. ii. p. 202, pl. xxxvii. figs. 14–20). Further, there seems little doubt that *S. quadricarinatum* (Reuss, 1846, Verst. der Böhmisches Kreidef. p. 105, pl. xlii. fig. 18; 1864, Sitz. d. Akad. d. Wiss. Wien, Bd. xlix. Abth. i. p. 238, pl. ii. fig. 14) is also the same species. *S. quadricarinatum*, which occurs in the Pläner-kalk of Bohemia, was likewise established on a carina. Darwin evidently accepted this as a separate species, mainly because of the truncated base shown in the figure (Reuss, 1846, pl. xlii. fig. 18); but surely this figure represents merely the apical part of a carina, and the truncated base is where the lower part has been broken away, for the growth-lines indicate that the parietes and intraparietes are incomplete at the base.

It is the later figure of *S. quadricarinatum* given by Reuss (1864, pl. ii. fig. 14) that best brings out the agreement both with *S. angustatum* (Geinitz) and *S. angustum* (Dixon), and, since it is evident that one species only is represented, this must be known as *S. angustatum* (Geinitz). Valves referable to *S. angustatum* are known to me from the Cenomanian and Turonian of England, and there is every reason to suppose that *S. angustatum* is the ancestor of the Senonian *S. fossula*, Darwin.

*Scalpellum angustum*, G. O. Sars (1879, Archiv. Math. og Naturv. Christiania, Bd. iv. p. 466; olim *S. stræmi*, C. Heller, 1878, Denkschr. k. Akad. Wiss. Wien, Bd. xxxv. p. 39, pl. iv. figs. 13, 14, non *S. stræmi*, M. Sars, 1859, Forhandl. Vidensk-Selsk. Christiania (1858), p. 158), is a recent species that appears to be generally accepted as distinct, and, since its name is preoccupied by *S. angustum* (Dixon, 1850), it may be re-named *S. sarsi*, nom. nov.

I am indebted to Mr. Henry D. Roberts, Director of the Brighton Museum, for the loan of the specimen, and also to Mr. C. T. A. Gaster for information with regard to the chalk pits in the neighbourhood of Southeram, Lewes.

## EXPLANATION OF PLATE X.

*Lepidocoleus grayæ*, sp. n.

Upper Ordovician, Lower Ardmillan series, Drummuck group,  
Mudstones: Thraive Glen, Girvan, Ayrshire.

*Fig. 1.* Side-view of a shell with the upper and lower extremities broken away.  $\times 3$  diam. Holotype, B.M., In. 21648.

*Fig. 2.* View from "fixed" margin of same.  $\times 3$  diam.

*Fig. 3.* Enlarged view of the two lowermost plates of same, showing details of ornament.  $\times 10$  diam.

*Fig. 4.* Diagrammatic transverse section.  $\times 6$  diam.

*Fig. 5.* Side-view of another shell, showing rounded basal extremity.  $\times 3$  diam. B.M., In. 21649.

*Scalpellum (Arcoscalpellum) fossula*, Darwin.

Upper Senonian, *Actinocamar quadratus*-zone. East Harnham,  
near Salisbury, Wilts.

*Fig. 6.* Left side of an almost complete capitulum. The rostrum is seen on the inside of the displaced right scutum, and the inner surface of the displaced right rostral latus is seen at the base of the capitulum.  $\times 3$  diam. B.M., In. 21559.

*Scalpellum (Arcoscalpellum) angustatum* (Geinitz).

Turonian (*Rhynchonella cuvieri* or *Terebratulina*-zone). Southeram,  
Lewes, Sussex.

*Fig. 7.* Carina. Outer view. Holotype of *S. angustum* (Dixon), Geol  
Sussex, pl. xxviii. fig. 9.  $\times 4$  diam. Brighton Museum.

*Fig. 8.* Side-view of same.

LXXX.—*Descriptions and Records of Bees*.—XCIV.

By T. D. A. COCKERELL, University of Colorado.

*Dianthidium sinapinum flavatum*, subsp. n.

*Anthidium flavatum*, Nurse MS.

♀ (type).—Like *D. sinapinum*, Ckll., from Karachi, but ocelli on a black patch, and a black stripe from each lateral ocellus to antenna; mesothorax with a median black stripe, ending posteriorly in a large black patch which includes extreme base of scutellum; halfway between middle and sides of mesothorax are broad black bands, not extending quite as far anteriorly as level of anterior margins of tegulae; margins of scutellum, on each side of the middle, less convex. Abdomen with a median black stripe, and extreme bases of segments black, giving a dusky effect to the translucent hind margins covering them.

♂.—A large quadrate black patch occupying front, limited above by a yellow occipital band, and at sides by narrow



orbital yellow bands, below by antennæ, or extending down to clypeus; mesothorax black, with broad lateral yellow margins, or the yellow, which curves round a short distance in front, may be connected anteriorly with subdorsal yellow bands, which are convex mesad; base of scutellum with a broad triangular black area. Abdomen with black or red median line and more or less defined basal bands; apex very broadly truncate, angulate at sides, with a median truncate process.

Decsa, India, March 1901 (*C. G. Nurse*), 2 ♀, 2 ♂.

The end of the male abdomen resembles that of *Anthidium bartholomei*, Rad., except that the median process is shorter and abruptly truncate as in *A. fedtschenkoi*, Mor. The sides of the sixth segment are angulate, but not produced posteriorly. Col. Nurse described this in MS. several years ago, but by some oversight the description was not published. He now asks me to make the insect known, as his MS. has been mislaid, and he has no materials for comparison. Specimens have been placed in the British Museum.

This species rests uncomfortably in *Dianthidium*, having no well-defined pulvilli, but it falls in the *bellicosum* group, as that is now understood.

### *Dianthidium saltator* (Nurse).

*Anthidium saltator*, Nurse, must also fall in *Dianthidium*, though the pulvilli are rudimentary. In describing *D. sinapium*, I suggested that it might be a race of *saltator*, but specimens of the latter received from Col. Nurse show that the species are quite distinct, particularly in the character of the scutellum.

### *Nomia borneana*, Cameron.

N. syn. *Nomia tuberculifrons*, Ckll., 1920.

I was able to determine the identity by comparison with Cameronian material of *borneana* in the British Museum.

### *Halictus punctatus* (Smith).

*Nomia punctata*, Smith, 1858, from Celebes, is a male *Halictus*, as shown by the type at Oxford. The mesothorax has very large punctures; area of metathorax with very coarse plicæ. Wings strongly dusky; prothorax has two sharp angles at each side; end of abdomen with a large round red plate.

*Halictus exlautus* (Cockerell).

*Halictus punctatus*, var. *exlautus*, Ckll., 1905, is apparently an individual variation, not a distinct race; but as the name *H. punctatus*, Smith, 1879, is preoccupied, *exlautus* is available for the species.

*Halictus latebralis*, n. n.

*Nomia flavipes*, Sm., 1858, is an *Halictus*, the name preoccupied by *flavipes* (Fab.), which is a distinct species, as Dr. Perkins has demonstrated. The type, from Celebes, is at Oxford. Outer recurrent nervure and intercubitus nearly obsolete.

*Halictus halictoides* (Smith).

*Nomia halictoides*, Sm., 1858, from Celebes; type at Oxford. There are bands of tomentum at bases of abdominal segments.

*Nomia clavata*, Smith.

From Gilolo; type at Oxford. *N. ceratina* (Smith) is very closely allied, but has first abdominal segment more slender, and head broad and transverse. See also 'Entomologist,' 1915, p. 178.

*Parasphecodes talchius*, Smith.

The type (♂) is at Oxford. Hair of head and thorax above ochraceous; first recurrent nervure falling a little short of second intercubitus; area of metathorax with close-set thick obtuse rugæ; the sculpture not prominent; abdomen dullish; antennæ very long, entirely black.

In my table in Ann. & Mag. Nat. Hist., Sept. 1904, p. 209, this falls nearest to *P. hilactus*, Sm., from which it is easily known by the black femora.

*Nomia basalis* (Smith).

*Halictus basalis*, Sm., ♂, from Singapore, is in the Oxford Museum, and is a *Nomia* with claviform abdomen, first segment bright ferruginous.

*Nomia basalicincta*, n. n.

*Nomia basalis*, Smith, 1875, from India, requires a new name.

*Perdita octomaculata* (Say).

In the Oxford Museum is a female of this species, with a manuscript name by Lepeletier. It appears to have originally belonged to Latreille.

## ANCYLOSCELIS, Latreille.

Latreille's original specimen is at Oxford, and is a black *Tetrapædia*. Wings dark, venation as in *T. diversipes*, Klug; scape red; clypeus and supraclypeal area highly polished; thorax above with erect black hair; hind tarsi and apex of tibiae red, with pale fulvous-tinted hair. Apparently a form of *T. diversipes*, or at least very closely allied. As no species was named, the way was left open for Haliday to later publish *Ancylosceles* (using a slightly different spelling) for another species which did, in fact, represent a new genus. Haliday, however, was not aware that his insect was generically distinct.

*Crocisa albopicta*, Cockerell.

At the British Museum I compared my type with that of *C. lugubris*, Smith. The spots are of the same colour in both. *C. albopicta* has a spot of white hair at median base of first abdominal segment, and the anterior median mark on mesothorax is bar-like; in *C. lugubris* there is no white spot at median base of first segment, and anterior median mark of mesothorax is pyriform in outline. They are, however, so much alike that we must write *C. lugubris*, var. *albopicta*.

*Halictus viridis*, Brullé.

La Laguna, Teneriffe, 1900 ft. (F. A. Bellamy). Oxford Museum.

Blue-green; abdomen same colour as thorax; area of metathorax with faint imperfect plicæ, but hardly any sculpture; stigma and nervures fuscous; hind spur of ♀ with long spines; anterior wing about 6.5 mm. long. Has rather the aspect of a *Ceratina*.

*Osmia cornifrons* (Radoszkowski).

This species, from Korea, was published as a *Chalicodoma*, and was referred by Fricse as a synonym of *O. taurus*, Smith. In the British Museum I found Smith's *taurus* and a cotype of *cornifrons*. The facial horns in *cornifrons* are much more widely separated, and finger-like instead of subtriangular. The abdomen is very hairy. They are certainly different species.

*Osmia simillima*, Smith.

I noted at British Museum: type (♀, Nova Scotia) of *simillima* looks exactly like type (♂, Florida) of *O. chalybea*, Smith; but in *simillima* the basal nervure goes a little basal of nervulus, in *chalybea* the reverse is true.

*Anthophora acervorum* (L.).

Linnaeus described his *Apis acervorum* from the black female, which Frieze calls var. *niger*. The species is, however, very variable, and the specimens before me may be separated thus:—

- |  |                                 |
|--|---------------------------------|
| Females .....  | 1.                              |
| Males .....  | 4.                              |
| 1. Hair of head, thorax, and abdomen black; red hair on labrum and outer side of hind tibiae and basitarsi (England) .....                               | <i>acervorum</i> (L.), s. str.  |
| Hair not thus black .....  | 2.                              |
| 2. Hair of cheeks white; pleura with white hair, becoming tawny and mixed with black above (Lisbon) .....  | var. <i>lisbonensis</i> , Ckll. |
| Hair of cheeks chocolate or nearly black ..  | 3.                              |
| 3. Hair of abdomen chocolate (France) .....  | <i>acervorum</i> , var.         |
| Hair of abdomen ferruginous (Tangier) ....   | var. <i>nigrofulva</i> (Lep.).  |
| 4. Abdomen dorsally beyond second segment with black or almost entirely black hair; hair of thorax usually fulvous (England) .                           | <i>acervorum</i> (L.), s. str.  |
| Abdomen dorsally beyond second segment with hair largely pale; thorax with hair not fulvous; lateral face-marks more deeply incised by black above ..... | 5.                              |
| 5. Abdomen with pale fulvous and black hair (Tangier) .....  | var. <i>nigrofulva</i> (Lep.).  |
| Abdomen with white and black hair (Lisbon and France) .....  | var. <i>lisbonensis</i> , Ckll. |

*Anthophora acervorum* (L.), typical.

St. Helens, I. of Wight, April 1921 (*Cockerell*) ; Icklesham, Sussex, March 1921 (*Cockerell*).

I also have a male, without locality, from the Gerstaecker collection. The English males have black tegulae, and the black patches on upper part of clypeus reduced to irregular spots or almost wholly absent. Possibly there is a distinct English race.

*Anthophora acervorum*, var. *lisbonensis*, nov.

♀ (type).—Aspect of the form *pennata* (Lep.) ; hair of labrum pale yellow, of cheeks white, of face and front black mixed with grey, of vertex black ; thorax above with hair mixed black and pale, slightly tawny, becoming pale tawny without black on metathorax (especially large tuft behind wings) and base of abdomen. Abdomen with pale tawny hair, slightly mixed with black on apical part of first segment, more conspicuously on apical part of second and on discs of third and fourth, fifth with a fringe of pure black hair ; sides of venter with greyish-white hair ; scopa of hind legs pale red ; tegulae ferruginous. Wings dusky greyish, not reddened as in *nigrofulva*.

♂.—Hair greyish white and black, without fulvous ; sides of clypeus with very broad black bands, enlarged above ; no yellow spot on mandibles. The genitalia agree with those of a specimen from St. Helens, I. of Wight.

Lisbon, Portugal, 1 ♀, 2 ♂, in the Botanic Garden, March 9, 1921 (*Wilmatte P. Cockerell*).

This may be essentially the same as the grey form which Alfken regards as var. *squalens* (Dours), but Dours describes *squalens* as uniformly covered with dull red hair. It was collected at Amiens. A male from France, received from Vachal, agrees with the Lisbon males, but the female sent with it has the hair dark chocolate, approaching typical *acervorum*. The form *pennata* (Lep.), described from Oran, resembles the Lisbon variety in the white hair on cheeks, but it is not identical, the male especially being differently coloured.

A paler variety than any of those indicated above has been named *aestivalis* (Panzer), while the var. *albipes*, Friese, has the scopa on hind legs white instead of red.

The female of *lisbonensis* is distinctly less robust than typical *acervorum*, wherein it more resembles the African forms. The var. *capillipes* (Sichel) resembles *lisbonensis* in

having the mandibles of the male without a light spot, but it is otherwise different. British males, and also the African *nigrofulva*, have the light spot.

*Mesotrichia rufosellata*, sp. n.

♀.—Length about 15 mm., anterior wing 12·5 mm.

Black, with the posterior part of mesothorax (less than half) and upper surface of scutellum densely covered with ferruginous hair, the red on mesothorax interrupted in middle; first abdominal segment dorsally with yellow hair, thin in middle; supraclypeal area and sides of face with white hair, with some black intermixed, and some light hairs on clypeus; pubescence otherwise black; maxillary palpi with first joint short, second and third very long, fourth much shorter than third, last two very small and slender, the fifth shortest; clypeus flattened, somewhat concave, closely punctured, with a narrow impunctate median line; a raised keel-like reversed U has its base above the supraclypeal area, and its diverging sides part way down the lateral margins of clypeus; scape long and curved; flagellum beyond the base red beneath; ocelli small; vertex well punctured; mesothorax bare, shining and impunctate in middle; tegulæ dark brown. Wings dark fuliginous throughout, strongly purple; middle and hind tibiæ short, and their basitarsi long; claws and tips of tarsi red; abdomen well punctured. The name is derived from the red saddle-like mark on the thorax.

Maritzburg, Natal, Feb. 1919 (*E. Warren*). "Boring in sunflower."

A species of the *Caffra* group, easily known by its small size and the area of red hair on thorax. It is not a colour-variety of *divisa*, Klug, being smaller and more slender, with the facial elevation quite different. The specimen was sent from the Natal Museum to Mr. Cedric Dover in Calcutta, who forwarded it to me. It will be returned to the Natal Museum.

*Andrena hirticornis*, Pérez.

A male in the collection of the Rev. F. D. Morice has four submarginal cells on one side, an abnormality I have never observed before. The insect has the general style and size of *A. suerinensis*, Friese; stigma ferruginous; second submarginal cell broad, receiving first recurrent nervure in middle; head very broad, face with pale ferruginous hair; thorax with red hair.

*Bombus dahlbohmi*, Guérin.

The type of *B. nigripes*, Haliday, is in the British Museum, and does not appear to differ at all from *dahlbohmi*. Most of the long series of this species in the Museum is from Chile, but there is one from V. del Lago Blanco, Patagonia, and one from Nose Peak Forest, Terra del Fuego, Jan. 19, 1905 (*R. Crawshaw*). The last is, perhaps, the most southern record for any bee in the world.

*Osmia foxi*, Cameron.

I examined the type in the British Museum. It is like *O. fulgida*, Cr., but with much broader abdomen, with hind margins of segments brilliant purple; apex strongly bilobed. The head is much broader than in *fulgida*, and the ocelli are larger. The tegulae are green. The wings are not quite so brownish as in *fulgida*, and the basal nervure falls just basad of the nervulus (in *fulgida* it meets the nervulus).

*Anthidium japonicum*, Smith.

Examined in British Museum. Second recurrent nervure going a short distance beyond outer intercubitus; no pulvilli. Looks like *A. florentinum*, with the yellow on thorax reduced to small marks on axillae and scutellum.

*Dianthidium caturigense* (Giraud).

*Anthidium caturigense* was examined in British Museum. Pulvilli present; second recurrent nervure going far beyond outer intercubitus.

*Megachile punctata*, Smith.

Smith's type is a male; in the British Museum my *M. suffusipennis* (type ♀) is placed as a synonym. However, Smith's *punctata* ♂ is larger and more robust than my *suffusipennis* ♀, and the abdomen is more heavily and closely punctured in *punctata*. A much smaller male in the Museum (56.43) has the abdomen punctured as in *suffusipennis* ♀, and evidently belongs to it. Thus *suffusipennis* is at least a distinct race, probably species.

*Megachile apiformis*, Smith.

This type (♀) is similar to *M. basalis*, Sm., type (♀), but *apiformis* is easily distinguished by the long black hair at sides of abdominal segments (seen from above) beyond the

second. *M. apiformis* has the mandibles largely red apically; *basalis* has them broadly and suffusedly dark reddish. According to Friese, *M. apiformis* is the female of *M. ungu-lata*, Sm.

*Megachile malayana auriceps*, Meade-Waldo.

Ekeikci, New Guinea, April 1903, 3 ♀ (*Pratt*). Cambridge University Museum. Perhaps a distinct species.

*Xylocopa simillima*, Smith.

Meade-Waldo has appended a note in British Museum :—  
“Almost certainly not Australian. New Holland is the locality given in Children’s collection, whence the specimens came.”

♀.—Abdomen dull red, black apically, the segments with narrow black bands. Wings very dark, shining purplish. Two females from Rio Grande do Sul, Brazil, have exactly the aspect of *simillima*, but Meade-Waldo notes : “Differ by pronounced keel on clypeus, and longer second abscissa of radial cell.”

*Andrena ruficornis*, Smith.

Canary Is.

I found this in the Oxford Museum, and noted the following characters :—Expanse about 26 mm., antennæ and legs red, hind femora dark ; anterior wings fuliginous, base and second discoidal cell hyaline, orange-tinted ; second submarginal cell very broad, receiving first recurrent nervure about middle ; mesothorax with strong sparse punctures ; area of metathorax very small, with strong rugæ ; abdomen shining, very finely punctured, without hair-bands or spots.

LXXXI.—*On a new Form of Epinephele from Cyrenaica.*  
By Lord ROTHSCHILD, F.R.S.

*Epinephele ida cyrenaica*, subsp. n.

♂. Differs from *ida ida* in having the black patches of androconial scales much reduced, consisting of narrow lines only. On the underside of the hind wings the irroration is obsolete, almost absent, the colour dark brown, NOT grey, and the white postmedian band very distinct, almost as in *pasiphae*.

Type, Driama, Cyrenaica, April 6th, 1922 (19 ♂ ♂, Ernst Hartert and Carl Hilgert leg.).



LXXXII.—On Mammals collected by C. Keysser in the Saruwaged and Rawlinson Mountains Region of N.E. New Guinea. By OLDFIELD THOMAS.

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By the kindness of Lord Rothschild I have had the opportunity of working out a number of mammals which were collected some years ago in the projecting eastern part of what was then German New Guinea by the Dutch Missionary, C. Keysser. The British Museum had never received any mammals at all from this region, while the few that have been recorded are themselves mostly from Mr. Keysser's collections, determined, and in some cases described, by Prof. F. Förster, sometimes in conjunction with Lord Rothschild.

The present collection is mostly from the great mountain mass known as the Saruwaged Mountains, of which the better-known Rawlinson Mountains are said to be mere outliers.

But from the mammal point of view, the Saruwaged and Rawlinson Mountains are almost equally unworked, so that the present collection is of very great interest, and adds materially to our present imperfect knowledge of New Guinea mammals.

1. *Mallomys hercules*, Thos.

♂, R.M. 9. Saruwaged Mts.

Only the second known specimen of this fine rodent, the first, the type, having been given to the Museum by Lord Rothschild in 1912.

2. *Anisomys imitator*, Thos.

♂, R. 22 (imm.). No exact locality.

3. *Stenomys rufulus*, sp. n.

R.M. 18, 19. Saruwaged Mts., 4000 m., August 1914.

A small species of a reddish colour.

Size and essential characters as in *S. niobe*, but colour strongly rufous. Upper surface uniform strong cinnamon-brown, sides scarcely paler, under surface sayal-brown, the hairs slaty for about two-thirds their length. Head and ears quite like body. Hands and feet darker brown. Tail apparently shorter than in *niobe*, but doubtfully perfect in the type.

Skull apparently as in *niobe*, the supraorbital edges smoothly

rounded. No tendency to the peculiar cranial inflation of *S. arrogans*.

Dimensions of the type (measured on skin):—

Head and body 122 mm.; tail (doubtfully perfect) 106; hind foot (wet) 27; ear 16.

Skull: greatest length 33.5; condylo-incisive length 30; nasals 12.6; interorbital breadth 5.8; breadth of brain-case 14.2; zygomatic plate 2.4; palatilar length 14.8; palatal foramina 4.9; upper molar series 5.7.

*Hab.* Saruwaged Mts., 4000 m. "From the highest point."

*Type.* Adult female. Original number 18. Collected August 1914 by C. Keysser. Presented by Lord Rothschild. Two specimens.

The strong cinnamon colour of this mountain-rat is peculiar to it, all the other species being of a dark brown.

The members of the genus *Stenomys* are characteristic of the New Guinea mountains, and are often the only Muridæ to be found at the higher altitudes. The present one, from 13,000 feet, occurs at a greater height than any as yet recorded.

#### 4. *Pogonomys sylvestris*, Thos.

Two specimens. Rawlinson Mts., June 1911.

Described on these examples in 1920.

#### 5. *Macropus keysseri lanatus*, subsp. n.

♂, R.M. 8 (Keysser No. 24), 10 (young). Saruwaged Mts., 3000–3800 m., August 1914.

♀, R.M. 6, 7, 14. Saruwaged Mts., 3000–3800 m., August 1914.

Essential characters as in *keysseri* of the Bulung region, but the fur much thicker, longer, and more woolly (hairs of hind back nearly 40 mm.), while the colour, instead of being nearly uniformly dark brown (face, nape, and back), is marked by there being a distinct nuchal mantle of lighter brown hairs separating the blackish crown from the dark brown back. General colour of back near "cinnamon-brown," the lighter tone, as compared with *keysseri*, being due to the greater development and prominence of the more or less cinnamon and very woolly underfur. Under surface much more strongly ochraceous than in *keysseri*, approaching "ochraceous-tawny." Tail more heavily clothed than in *keysseri*, well-haired throughout; bicolor, the upper side dark brown, the lower dull buffy whitish.

Skull quite as in *keysseri*.

Dimensions of the type (measured on skin):—

Head and body 700 mm.; tail 420; hind foot (wet) 136; ear (wet) 54.

Skull: greatest length 110; condylo-basal length 108; zygomatic breadth 58; nasals  $41 \times 17.5$ ; intertemporal breadth 12.6; palatal length 66; length of  $p^4$  7.2; combined length of  $ms^{1-3}$  \* 18.5.

*Hab.* as above.

*Type.* Adult male. Original number 8 (Keysser number 24). Collected August 1914.

This Kangaroo, as is shown by its skull, is evidently nearly allied to *M. keysseri*, of which it would appear to be a high-altitude race, distinguished by its long woolly fur and somewhat different colour.

In making this comparison I have had, by Lord Rothschild's kindness, the advantage of examining the type, an old male, of *M. keysseri*, which was collected by Mr. Keysser in the Bulung region, inland of the Huon Gulf, at an altitude of about 1800–2000 m.

\* In describing this and other Marsupials of the present collection, my attention has again been drawn to the inconvenience systematic workers suffer from the present absence of a common nomenclature of the teeth. This absence is largely due to my own desertion of the ancient Marsupial formula of P. 3, M. 4, on account of its being possibly erroneous. For the correct formula was by some authors thought to be P. 4, M. 3, as in other mammals, the seven postcanine teeth being then serially and individually homologous with each other in the two groups. This latter was the view taken in a paper on the nomenclature of the teeth published in 1905 †, and since that date I have not ventured definitely to assign any Marsupial cheek-tooth to its serial place, and in giving descriptions and measurements I have used words, such as "molariform tooth," correct on either theory.

Now, however, on reviewing the whole subject, it seems to me that it would be better to revert to the old notation, that used in the 'Catalogue of Marsupials,' until such time as more definite proof is brought forward of the incorrectness of this notation.

The four premolars, with the last changing, of the Mesozoic *Triconodon*, not to mention the four present in the abnormal *Phascogale* on which I largely based my 1887 ‡ paper, seem to me to speak very strongly in favour of the old view, even if some arguments may be found against it.

I therefore now propose, in systematic descriptions, to revert to the Catalogue notation, with the secutor reckoned as  $p^4$ , and the "three anterior molariform teeth" called, as in that work,  $m^1$ – $m^3$ .

The paper of 1892 § would, therefore, again fairly represent the views I now hold on the various theories which have been put forward in regard to the subject of Marsupial tooth-homologies.

† P. Biol. Soc. Wash. xviii. p. 191 (1905).

‡ Phil. Trans. 1887, p. 443.

§ Ann. & Mag. N. H., April 1892, p. 308.

Matschie's *Thylogale lauterbachii*, on the other hand, also from this part of New Guinea, seems to be a low-country form, with short fur only 15 mm. in length. A skin of it, without skull, was obtained by Mr. Keysser on the Sattelberg.

6. *Macropus keysseri lauterbachii*, Matsch.

♀, R. 6. Sattelberg, May 1907.

7. *Dendrolagus matschiei*, Först. & Rothsch.

Young, R.M. 11. Saruwaged Mts., 2000 m., August 1914.

8. *Dorcopsulus* \* *rothschildi*, sp. n.

♀, R. 5. Rawlinson Mts.

♀, R.M. 3, 15, 20. Saruwaged Mts., 3000 m., August 1914.

Fur very long, soft, and glossy; hairs of back about 35 mm. in length. General colour above dark shining chocolate-brown, near "Mars-brown," not the more smoky greyish brown of *D. vanheurni*, bases of hairs greyer. Under surface dull whitish brown, the belly browner, the chest and inguinal region lighter. Face quite like back. Ears thickly haired, dark brown, their inner surface lighter. Outer side of limbs and hairy part of tail uniformly dark brown.

Skull rather larger than that of *vanheurni*, smaller than that of *macleayi*. Nasals less projecting mesially beyond the maxillo-frontal suture than in either of the other species, their hinder edge nearly transverse; secator rather shorter than in the other species, the four specimens available having this tooth 8·8, 7·6, 8·4, 8·5 mm. in length as compared with 9·8, 9·9 in *macleayi* and 9·2 in *vanheurni*.

Dimensions of the type (measured on the skin):—

Head and body 480 mm.; tail 270; hind foot 94; ear 34.

Skull: greatest length 85; condylo-basal length 80·5; zygomatic breadth 42·5; palatal length 48; palatal foramina 3·8; length of secator 7·7; combined length of  $ms^{1-3}$  12·4.

*Hab.* of type. Saruwaged Mts., 3000 m.

*Type.* Adult female. Original number 20. Collected August 1914.

This well-marked species is decidedly browner and less

\* With some hesitation I accept Matschie's separation under the above name of the *macleayi* group of *Dorcopsis*, on account of the short muzzle of the skull, the less elongate secator, which only just equals  $m^1 + m^2$  instead of  $m^1 + m^2 + \text{half } m^3$ , and the more extended and abrupt nakedness of the tail.

smoky grey than either of the other two members of *Dorco-psulus*, its fur is much longer than that of *macleayi*, rather longer than that of *vanheurni*, its nasals are less projected backwards, and its secator is comparatively short. I have named it in honour of Lord Rothschild, to whom the National Museum is indebted for the fine series of specimens in which it occurs.

9. *Geonix maculatus*, Geoff.

2 ♂ and a separate head, R. 2, 3, and 4. Sattelberg.  
♂, R. 1. Stephansort, C. Wehnes.

10. *Phalanger orientalis*, Pall.

2 ♀ and young, R. 8, 9, and 11. Rawlinson Mts., April 1907.

This represents Prof. Foerster's "*Pseudochirus vulpecula*," which he described as "eine kleiner Art aus der *albertisi*-Gruppe," of that very different genus, the young specimen, R. 11, in the well-known red juvenile phase, corresponding so closely to his description that it might almost be his type.

11. *Phalanger coccygis*, sp. n.

♂, R.M. 13 (Keysser No. 26). Saruwaged Mts., 3000 m., August 1914.

♂, R. 7, and another, no. 11. 10. 13. 1, already in the British Museum. Rawlinson Mts.

Nearly allied to *Ph. carmelitæ*, but larger and with a more defined dorsal stipe.

Size, as gauged by skull, distinctly larger than in *carmelitæ*, slightly larger than in *sericeus*. Fur thick, rich, longer than in *carmelitæ*, shorter than in *sericeus*. General coloration as in those species, the upper surface chocolate-brown, the under surface white, the hairs white to the roots. The dorsal colour is, however, rather darker than in *carmelitæ* without being of the glossy blackish of *sericeus*. A black median line perceptible on the fore back, not strongly defined, though more so than in either of the allied species. Tail with nearly half its length furry.

One of the two Rawlinson Mts. specimens has a number of whitish hairs mixed with the brown, but the other not.

Skull about as in *carmelitæ*, but larger; supraorbital ridges well marked.

Teeth as in *carmelitæ*, the small premolar between the secator and the anterior premolar present in both skulls, as it is in *carmelitæ*, while it is absent in our three skulls of

*sericeus*. And in the lower jaw, both in *carmelita* and *coccygis*, there are three small intermediate unicuspid, while there are only two in the three available specimens of *sericeus*.

Dimensions of the type (measured on the skin):—

Head and body 515 mm.; tail 330; hind foot 51.

Skull: condylo-basal length 86; zygomatic breadth 53·7; nasals, length 33·6, least breadth 8, greatest breadth 14; intertemporal breadth 9; mastoid breadth 42; diagonal diameter of scaptor 5; combined length of  $ms^{1-3}$  16·5.

*Hab.* Saruwaged Mts., alt. 3000 m.

*Type.* Adult male. Original number 26. Collected August 1914 by C. Keysser.

This species is no doubt very nearly allied to *Ph. carmelita*, but its larger size and the development of a dorsal line seem to justify its being given full specific rank, especially as the third chocolate-coloured cuscus, *Ph. sericeus*, proves to differ from both the other species by a permanent difference in the number of intermediate teeth present. This character is usually considered impermanent and untrustworthy, but is here constant through a series of 14 skulls of the three forms.

## 12. *Pseudochirus corinnæ argenteus*, Först.

♂, R.M. 5. Saruwaged Mts.

♂, R. 15. Rawlinson Mts.

Not sexed, R. 10. Rawlinson Mts., 1500 m., June 1911.

The last specimen appears to be the example of "*corinnæ*," which, by its unusually strong coloration, induced Prof. Förster to apply the rather unsuitable name of *argenteus* to a less rufous example.

South of the present region there seems to be a definable subspecies of this group, which may be called

## *Pseudochirus corinnæ cæcias*, subsp. n.

Size rather smaller than in true *corinnæ*, and colour more reddish brown. General colour above, as compared with that of *corinnæ*, more umber-brown, the rump and base of tail near "Brussels-brown" or even approaching "hazel." Face "buffy brown" instead of "hair-brown." Otherwise the character of the markings, the dorsal black line, and the light ear-patches are all as in true *corinnæ*.

Skull smaller than in *corinnæ*; nasals less expanded behind.

Dimensions of the type (measured on skin):—

Head and body 340 mm.; tail 275; hind foot 40.

Skull: greatest length 61; upper length 58; zygomatic

breadth 35.5; nasals  $20.7 \times 8.5$ : interorbital breadth 77; palatal length 34; combined length of  $ms^{1-3}$  12.2.

*Hab.* North-eastern slope of the dividing range of S.E. New Guinea. Type from the Upper Bagua River, Mambare River. Alt. 3000'.

*Type.* Adult female, B.M. no. 7. 5. 22. 8. Collected 28th September, 1906, and presented by C. A. W. Monckton, Esq.

Compared with five examples of the true *corinnæ*, from the Vanapa, Aroa, Brown, and Angabunga Rivers, all on the south-western slope of the dividing range, this *Pseudochirus* differs by its decidedly stronger and warmer coloration and the somewhat smaller size of its skull.

### 13. *Pseudochirus larvatus*, Först. & Rothsch.

♂, R. 12, 13, 14. Mountains inland from Huon Gulf.

♀, R.M. 16. Saruwaged Mts.

An interesting series of this very handsome and distinct species.

### 14. *Petaurus papuanus*, Thos.

R.M. 17. Saruwaged Mountains.

### 15. *Distæchurus pennatus neuhaussi*, Matsch.

R.M. 21. Saruwaged Mts.

R. 20. Rawlinson Mts. *Topotype* of *amœnus*.

R. 21. Sattelberg, June 1911. *Topotype* of *neuhaussi*.

In ignorance of Dr. Matschie's description of *D. neuhaussi* \* (1916), I described *D. p. amœnus* † from the Rawlinson Mountains in 1920. But there is no doubt that the two are the same.

### 16. *Echymipera doreyana*, Q. & G.

♂, R. 18; ♀, R. 19. Stephansort, C. Wehnes.

♂, R. 17. Sattelberg, C. Keysser.

### 17. *Peroryctes rothschildi*, Först.

♂, R.M. 4, 12; young, 22. Saruwaged Mts., 2000 m., August 1914.

♀, R. 16 (young). Rawlinson Mts.

Prof. Förster described two species of this group in 1913 from the present region—*P. rothschildi* and *P. mainois*. In

\* Mitth. Zool. Mus. Berl. viii. p. 292 (1916).

† Ann. & Mag. N. H. (9) vi. p. 537 (1920).

view, however, of the considerable variations in colour in this genus, and the alteration of characters due to age, I am not at present prepared to admit more than a single species as occurring in the Saruwaged Mountains. One of the adults, No. 4, has its fur profusely mixed with greyish white anteriorly, while No. 12 has no grey at all, and the general colour is far more rufous. Much more material is needed before any sound opinion on the number of species can be arrived at.

LXXXIII. — *The Generic Name of the Finless-backed Porpoise, formerly known as Neomeris phocaenoides.* By  
OLDFIELD THOMAS.

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THE question of the proper treatment of misprints in generic names is one that bristles with difficulties, and needs most careful consideration in every case. Sometimes, when the misprinted name has been used in a perfectly valid form, it would seem that we ought to recognize it as having full status, in spite of its being obviously or presumably a misprint. This was the course I followed in renaming the *Dryomys* of 1906, because of the accidental use of that name (as a misprint for *Dryomys*) by Philippi six years before, and it has received the approval of later writers. When, however, the misprint is not, viewed simply by itself, strictly valid, for want of diagnosis or identifiable type-species, the name should be considered as having no status at all. This would, for instance, apply to Wallace's *Neotomys* of 1876, which antedates, but does not invalidate, my *Neotomys* of 1894.

Now, this question of misprints arises in the case of the Porpoise to which Gray applied the generic name of *Neomeris*, for that word proved to be invalid owing to its having been used earlier for an invertebrate, and in dealing with it Palmer, when preparing his great work on nomenclature, replaced it by *Neophocaena*, after quoting two other names which he set aside as misprints. His notice of *Neomeris*, abbreviated, is as follows (exact references are given in his 'Index Generum Mammalium,' p. 453, 1904):—

*Neomeris*, Gray, 1846, *nec* Lamouroux, 1816.

*Meomeris*, Gray, 1847.

*Nomeris*, Coues, 1890, and, finally,

*Neophocaena*, Palmer, 1899.



Taking *Nomeris* first, as being the clearest case, I confess I see no way of putting it aside. Even its being a misprint is purely an assumption, while the sentence in which it is founded is perfectly properly worded, with a genotype (*Phocæna melus*, misprint for *Ph. melas*, a recognized synonym of *Ph. phocænoides*) and a couple of words of diagnosis, so that there can be no doubt whatever as to what animal it applies to, or as to the technical validity of its foundation. It should, therefore, be recognised as a name having technical status, and, being earlier than *Neophocæna*, would naturally invalidate that. We may believe *Nomeris* was a misprint, but there is no evidence to that effect, and, even if it had been said to be so by its author, that would not remove its technical validity.

But there is an earlier name, *Meomeris*. In Gray's 'List of the Osteological Specimens in the British Museum,' 1847, this name appears in the Systematic Index on p. xii, in its proper place next to *Phocæna*, with the species-name *phocænoides*, and there being only one *phocænoides* in the family Delphinidæ, it is clear what is the genotype of *Meomeris*. In the body of the work (p. 36) we have "The Finless Porpoise, *Meomeris phocænoides*," placed as the only species of the genus *Neomeris*. It may, therefore, be assumed that *Meomeris* is a misprint for the earlier name *Neomeris*, but none the less it is put in too valid a way to be ignored, having both type-species and a descriptive word. I therefore maintain, on the lines used in dealing with *Dryomys*, that *Meomeris* should be considered as having full technical status, and that, instead of the much later *Neophocæna*, it should be used for the Finless-backed Porpoise, whose full name would thus be *Meomeris phocænoides*.

LXXXIV.—*The Bandicoots of Nuyts Archipelago, S. Australia, and of Cape York, N. Queensland.* By OLDFIELD THOMAS.

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PROF. F. WOOD JONES, of Adelaide, has sent to the British Museum two spirit-specimens and four picked-up skulls of the Bandicoot which inhabits the Nuyts Archipelago, where also he had previously obtained the interesting Murine *Leporillus jonesi*, described by me last year. In sending them, he has drawn my attention to certain characters in which they

differ from the mainland Bandicoot, and on comparison I find the difference so marked and so constant as to be worthy of recognition by name. In examining the skulls I have had for comparison the fine series of *Isoodon obesulus* obtained by Mr. Shortridge in South-west Australia, a series numbering nine males and five females, and showing well the age and sex characters found in this difficult genus.

The island-form I would propose to call

*Isoodon nauticus*, sp. n.

Size markedly smaller than in the continental *obesulus*, the skull of an adult male only about 55 mm. in length, as compared with 70 or more in *obesulus*. General colour comparatively pale; under surface white; hands and feet with grey-brown metapodials and white digits; tail brown above, whitish below.

Skull far smaller than in *obesulus*, smooth, and almost without cranial ridges, the sagittal crest obsolete, and even the two lateral thickenings of the occipital much less developed than usual. Nasals much shorter and narrower than in *obesula*. Bullæ not far from as broad as in *obesula*, but peculiarly shortened, rather abruptly cut off behind.

Teeth small throughout. The three juxtaposed incisors,  $i^2-i^4$ , together about 3 mm., as compared with 4.5 and upwards in *obesulus*. Canines short. Secator and molars all proportionately reduced.

Dimensions of the type (measured on the spirit-specimen before skinning):—

Head and body 242 mm.; tail (damaged, 103 mm. in another rather younger specimen); hind foot 50.

Skull: greatest length 54.5; condylo-basal length 53; zygomatic breadth 25.3; nasals  $21.7 \times 5.2$ ; intertemporal breadth 11.6; palatal length 31; oblique diameter of bulla 10.3; dental length 98; front of canine to back of  $m^4$  20.5; diameter of secator 2; combined length of  $m^{1-3}$  8.5.

*Hab.* Franklin's Island, Nuyts Archipelago, S. Australia.

*Type.* Adult male. B.M. no. 22.4.15.6. Collected and presented by Prof. F. Wood Jones.

The main difference of this island Bandicoot from *I. obesulus* is its markedly smaller size, as compared with continental specimens of corresponding sex. Its bullæ are also shorter, and it is probable, as occurs with other insular forms of the genus, that there is less sexual difference in size than in the mainland animal.

In working out this animal, I have again examined a fine series of Bandicoot skins and skulls obtained by Mr. Robin Kemp at the extreme north end of the Cape York Peninsula in 1912-13. Some of them are the large animal with an extra crook on its  $m^1$ , which represents Ramsay's *torosus*, whether that is or is not separable from Gould's *macrourus*.

But the series of a small species related to *auratus* seems certainly to be distinguishable, and may be called

*Isodon peninsulae*, sp. n.

Size and general characters as in *I. auratus* of the Northern Territory of S. Australia. Colour, on the whole, similar, but the light bands on the hairs are paler, more buffy, less ochraceous, and, especially, the sides have not the ochraceous wash generally found in *auratus*, and no doubt the basis of its name. Under surface white.

Skull, as in *auratus*, distinguished from that of *obesulus* by the almost complete absence of any sexual difference in size, the males not or but little longer than the females. General size about as in *auratus*, but the muzzle decidedly longer and not so conical. A skull of *auratus* with a zygomatic breadth of 29 mm. has a muzzle length (orbit to gnathion) of 29.6 mm., while one of *peninsulae*, with the same breadth, has its muzzle 33 mm.; and this difference runs throughout the good series available. Nasals in consequence markedly longer. Palatal vacuities and bullæ slightly smaller, but both as usual very variable.

Teeth, on the whole, rather smaller than in *auratus*, but the difference very slight.

Dimensions of the type (measured in the flesh):—

Head and body 308 mm.; tail 116; hind foot 56; ear 31.

Skull: greatest length 62.5; condylo-basal length 62; zygomatic breadth 29; nasals  $25 \times 5$ ; orbit to gnathion 33; intertemporal breadth 12; palatal length 37; anterior palatal foramina 4.6; palatal vacuities 5.6; oblique length of bulla 13.3. Dental length 33.5, front of canines to back of  $m^4$  24.5;  $ms^{1-3}$  10.

*Hab.* Northern Cape York. Type from Utingu, others from Cable Station.

*Type.* Adult male. B.M. no. 15.3.5.71. Original number 2415. Collected 20th September, 1912, by Robin Kemp. Fifteen specimens examined.

Distinguishable from *auratus* by its comparatively long muzzle.

LXXXV.—*Two new Subspecies of Phalanger orientalis.*  
By OLDFIELD THOMAS.

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*Phalanger orientalis ducatoris*, subsp. n.

Intermediate in size between *orientalis* and *breviceps*. Colour and general appearance, at least of female, as in *breviceps*; adult male not known. General colour above of the usual dark grey varying to brown; under surface dull whitish. Dorsal line present, not conspicuous. Hairy part of tail like body, not yellowish as it generally is in *breviceps*.

Skull rather larger than that of *breviceps*, considerably smaller than in *orientalis*. Muzzle and interorbital region distinctly longer than in the former. Supraorbital ridges well developed, more so than in female *orientalis*, but whether the male has the greatly developed ridges found in *breviceps* is not at present known. Teeth and other characters about as in *breviceps*.

Dimensions of the type (measured on skin):—

Head and body 520 mm.; hind foot 62.

Skull: back of glenoid fossa to gnathion 65; postorbital process to tip of nasals 47; zygomatic breadth 46; nasals  $33 \times 12.2$ ; interorbital breadth 10; dental length 41.3; greatest diameter of secator 4;  $ms^{1-3}$  15.

*Hab.* Duke of York Island, between New Britain and New Ireland.

*Type.* Adult male. B.M. no. 78.2.5.6. Collected by the Rev. G. Brown.

This is the animal which Alston referred to *orientalis*\*, and which in the Catalogue I placed with the Solomon Island Cuscus—*Phalanger breviceps*. It is, however, evidently an intermediate form inhabiting the Duke of York group and no doubt both New Britain and New Ireland, and should apparently have a special subspecific name.

On the other hand, the Phalanger of Ruk Island, between New Britain and the mainland, is as large as true *Ph. orientalis*.

*Phalanger orientalis mimicus*, subsp. n.

As in true insular *orientalis*, but much smaller. General colour of a male very similar to topotypical Amboina *orientalis*, the upper surface pale drabby grey, more intense across

\* *Cuscus orientalis*, P. Z. S. 1877, p. 126.

the shoulders, lightening on face, fore limbs, and sides to whitish grey; under surface white. Dorsal line distinct, from nape to hind back. The usual white patch at the base of the ear. Hind limbs and base of tail drab-grey.

Skull essentially as in true *orientalis*, but the supraorbital ridges comparatively little developed, though the type is an old male, the anterior part of the interorbital space with rounded edges, and the postorbital processes much reduced. Sagittal crest medium. Teeth as in *orientalis*, but smaller, much smaller than in *gymnotis*. Canines projecting far beyond a line connecting the tips of  $i^1$  and  $p^4$ .

Dimensions of the type (measured in the flesh):—

Head and body 400 mm.; tail (damaged); hind foot 55; ear 25.

Skull: greatest length 79; condylo-basal length 76; zygomatic breadth 49; nasals  $27.5 \times 12.5$ ; interorbital breadth 11.4; tip to tip of postorbital processes 14.2; intertemporal breadth 9.5; dental length 42; diameter of  $p^4$  4.3; combined length of  $ms^{1-3}$  13.3.

*Hab.* Coastal region south of Nassau Range. Type from Parimau, Mimika River. Alt. 250'.

*Type.* Fully adult male. B.M. no. 11.11.11.93. Original number 3080. Collected 4th October, 1910, by G. C. Shortridge. Presented by the B.O.U. New Guinea Expedition.

This animal is so conspicuously smaller than any form of *Ph. orientalis* inhabiting the mainland of New Guinea that it should certainly be distinguished. Its skull is no larger than that of the little *Ph. breviceps* of the Solomon Islands, but has not the remarkably developed supraorbital ridges found in that species.

In the same region there would seem to be a larger Cuscus, which was referred by Jentink to the *Ph. gymnotis* of the Aru Islands. A young specimen possibly referable to it was obtained by the B.O.U. Expedition at the same time as the present form.

LXXXVI.—*A new Rock-Wallaby (Petrogale) from the Islands off South Australia.* By OLDFIELD THOMAS.

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THE British Museum owes to Prof. Wood Jones an example of the Rock-Wallaby inhabiting Pearson's Isles, which are part of the Investigator group, in the eastern portion of the Great Australian Bight, about  $134^\circ$  E.,  $34^\circ$  S.

By its general characters the animal is clearly related to the West Australian *Petrogale lateralis* of the Swan River district and to *P. hacketti* of Mondiam Island. This latter was described as a subspecies of *P. lateralis*, but I should now give it specific rank on account of its uniformly larger size and certain differences in the structure of its skull.

The new form is thus situated far to the east of the previously known members of the group, with the large *hacketti* between it and the form which it—at least superficially—most resembles.

It may be called

*Petrogale pearsoni*, sp. n.

Size comparatively small, about as in *lateralis*, decidedly smaller than in *hacketti*. General colour, on the whole, very much as in *lateralis*, paler than in *hacketti*. Dark lateral lines of the underside, however, more blackish, those of *lateralis* being dark brown. White patches at base of ears larger and more prominent. Tail with its upper and under surfaces, from about 3 inches from the base, contrasted black, the sides dull buffy whitish; above, the black soon fades off into the brownish terminal tuft, but below it continues to within 2 inches of the tip. This tail-coloration is, on the whole, more as in *hacketti* than *lateralis*, but in both there is considerable variation.

The usual narrow black dorsal line is continued rather more definitely on to the rump than in any of our specimens of *lateralis*, but the difference may be due to this part being in fresh pelage, and so showing the line more distinctly.

Skull in size and general shape quite as in *lateralis*, smaller and with less heavy supraorbital ridges than in *hacketti*. Palatal foramina comparatively long, about as long as in *hacketti*. In the bullæ there is a difference between *lateralis* and *hacketti* which had not been previously noticed. In the former they are fairly well swollen, anteriorly as well as posteriorly, so as to produce a transverse convexity (hardly to be called a ridge), in front of which the bone descends nearly vertically towards the level of the glenoid surfaces. In *hacketti*, however, the whole bullæ is larger, but lower and more spread out, its front part evenly and gradually descending towards the glenoid level without marked transverse convexity. In *pearsoni* the bullæ are most like those of *hacketti*, although perhaps a little more swollen. In making this comparison six skulls of *hacketti* and ten of *lateralis* have been available, so that the difference is evidently fairly constant.

Incisors a little larger than in *lateralis*, the whole row 10 mm. in length, about as in *hacketti*, as compared with about 9 mm. in *lateralis*. Secator also slightly larger than in *lateralis*, much smaller than in *hacketti*.

Dimensions of the type (measured on the remade skin):—

Head and body 500 mm.; tail (imperfect); hind foot 136; ear 43.

Skull: greatest length 94; condylo-basal length 90; zygomatic breadth 48; nasals  $39 \times 14$ ; palatal foramina  $7.7$ . Length of  $i^3$  4.5, of  $p^4$  6.9. Combined length of  $ms^{1-3}$  (unworn) 19.

(Specimen with  $p^4$  wholly and  $p^3$  partly below the bone.)

*Hab.* Pearson's Isles, Investigator Group, S. Australia.

*Type.* Immature male. B.M. no. 22.4.15.1. Collected 25th November, 1920, and presented by Prof. F. Wood Jones.

While the size and general appearance of this *Petrogale* are most like those of *P. lateralis*, the length of the palatal foramina, the comparatively large incisors, the coloration of the tail, and, most of all, the characters of the bullæ all indicate a relationship to the Mondrain Island species.

The Museum is much indebted to Prof. Wood Jones for this interesting specimen, all the more that the maritime difficulties of getting to the islands are such as to deter any mere casual tourists.

LXXXVII.—*A Preliminary Note on Two Strongylata from Swine in the Pacific.* By CLAYTON LANE.

COLLECTED by Dr. F. W. O'Connor, and received through his courteous generosity, the nematodes here reported upon appear to belong to two new species whose interesting affinities will be more fully dealt with subsequently.

*Globocephalus connorfilii*, sp. n.

Stoutish, short, bursate nematodes; the oral aperture unarmed and dorso-subterminal; the oral capsule not globular, but elongate antero-posteriorly, and provided with a pair of rudimentary, basal, subventral teeth projecting into the oral cavity which conforms to the shape and size of the capsule. This latter has two transverse thickenings—one close and parallel to the almost circular oral aperture, the other at the

capsule's attachment to the œsophagus and angular in lateral view. The dorsal œsophageal gland discharges through a tunnel in the mid-dorsal line, and opens unprominently into the oral cavity.

The *male* has a length of 4.5\* and a maximum breadth about the equator of 0.275. The dorsal rays are united for nearly three-quarters of their length, the ununited portion of each ray almost immediately bifurcating into an outer thin and an inner stout branch, the latter again dividing. The bases of the externo-dorsal rays occupy, not quite symmetrically, the second quarter of the dorsal ray. The lateral rays spring from a common base; the dorso-lateral is the stoutest, separated from the medio-lateral by a deep cleft, both rays having a dorsal trend; the externo-lateral, separated from the medio-lateral by a somewhat shallow cleft, has a slight ventral trend; the ventral rays are apposed, the prebursal papillæ are long. The equal and similar spicules measure 0.275 long, are gently tapering, and have their fine rounded tips curved posteriorly; the accessory piece is 0.09 long.

The *female* has a length of 6 and a maximum breadth about the equator of 0.325. The distance between the anterior end and the cervical papillæ, nerve-ring, and excretory pore is 0.375; the distance of the end of the œsophagus from the anterior extremity is 0.75. The vulva lies 2.4 from the tip of the conical tail; the intra-uterine ova measure 0.06 by 0.04.

*Crassisoma samoense*, sp. n.

Stoutish, short, bursate nematodes, with the oral aperture dorso-subterminal and guarded ventrally by a pair of semilunes. The oral capsule is nearly globular (the oral cavity corresponding to its shape and size) and is provided with a pair of large basal subventral teeth, each irregularly quadrilateral in shape, attached by its ventral border and prominently pointed at its free angles. The dorsal œsophageal gland discharges through a tunnel in the dorsal mid-line and opens unprominently into the oral cavity.

The *male* has a length of 5.27 and a maximum breadth about the vesicula seminalis of 0.29. The dorsal rays are united for about seven-eighths of their length; the free portion divides much as does the corresponding ray of *Globocephalus connorfili*. The externo-dorsal rays spring from the bases of the united dorsal rays; the other rays

\* All measurements are in millimetres.



have a general arrangement resembling that of *G. connor-filii*; the prebursal papillæ are small. The equal and similar spicules measuring 0.4 produce together a lyrate appearance at their points when seen from dorsum or venter. The length of the accessory piece is 0.055.

The *female* has a length of 5.25 and a maximum breadth about the equator of 0.35. The distances between the anterior end and the cervical papillæ, nerve-ring, excretory pore, and œsophageal termination are respectively 0.45, 0.4, 0.425, and 0.75. The vulva lies 2 from the tip of the caudal mucron. The intra-uterine ova measure 0.065 to 0.07 by 0.04.

LXXXVIII.—*Description of a new Typhlops from Tanganyika Territory.* By JOAN B. PROCTER, F.Z.S.

*Typhlops excentricus*, sp. n.

*Diagnosis*.—Closely allied to *T. mucroso*, Ptrs., from which it may be distinguished by the shape of the rostral (which is truncated instead of rounded posteriorly), by the nasals (which meet each other behind the rostral), and by the comparative slenderness of its body (which is 44 times its diameter as against 35). It also differs from the typical *mucroso* in having the lower surfaces finely variegated, as in the form described as *T. humbo* by Bocage.

*Description*.—Head strongly depressed, ornamented above and beneath with minute excrescences disposed thickly at regular intervals. Snout with sharp cutting-edge, flat beneath and projecting to a distance equal to half length of head.

Rostral small, not extending nearly to level of eyes; portion on upper surface of head squarish, portion beneath snout triangular, equilateral. Nostils inferior; nasals semi-divided, the cleft extending from first labial, meeting each other above by a short suture behind rostral; præoculars about two-thirds breadth of oculars, pointed above and beneath; eyes distinguishable, superior; oculars separated from each other by three scales; mouth minute.

Body with 30 scales round the middle, depressed\*, its total length about 44 times its diameter. Tail broader than long, ending in a spine.

\* The sloughed skin shows that the depression of the body is to some extent natural, and not due to distortion on preservation.

Head nearly black, a broad metallic-silver collar on upper surface of neck. Body minutely variegated with dark grey on silver, equally variegated beneath, but brighter and more yellowish in tone; end of tail silver, terminal spine darker. The whole body has a metallic lustre, and the under surface somewhat resembles certain biotite or hornblende granites when polished.

Total length 395 mm.

This species is described from a single adult, collected by Mr. Loveridge near Kilosa, Tanganyika Territory. The specimen was dispatched to Mr. Crowther, of Dulwich College, alive, but died upon the way after having shed its skin. It is now preserved in the collection of the British Museum.

Its name—*excentricus*—refers to its general appearance, which is odd in the extreme.

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LXXXIX.—*Four new Fishes from Tanganyika Territory.*  
By J. R. NORMAN.

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THE fishes described below form part of a collection from Mpanganye, Rufigi River, Tanganyika Territory, received from Mr. A. Loveridge.

*Distichodus rufigiensis*, sp. n.

Depth of body  $2\frac{1}{4}$  to  $2\frac{1}{2}$  in length, length of head  $4\frac{1}{4}$  to  $4\frac{1}{2}$ . Head as long as deep, about twice as long as broad. Snout not compressed, projecting beyond mouth, its length 1 to  $1\frac{1}{3}$  times diameter of eye, which is  $3\frac{1}{4}$  to 4 in length of head and  $1\frac{1}{3}$  to 2 in interorbital width. Maxillary extending to below nostril; teeth in 2 series in both jaws, 20–25 in outer series of upper jaw. 15 gill-rakers on lower part of anterior arch. Dorsal 19–20 (4 unbranched), equally distant from occiput and caudal, or a little nearer latter; longest rays distinctly longer than head. Adipose fin moderately large, separated from rayed dorsal by a space equal to  $\frac{2}{3}$  the base of the latter. Anal 14–15 (3 unbranched); base  $\frac{2}{3}$  base of dorsal. Pectoral  $\frac{3}{4}$  to  $\frac{4}{5}$  length of head, shorter than pelvics. Caudal forked, upper lobe pointed and slightly longer than lower, which is

rounded. Caudal peduncle much deeper than long. 62-65 scales in a longitudinal series, 11-12 from origin of dorsal to lateral line. About twelve more or less distinct but broken vertical bars on sides of body, ending below lateral line; a black spot on caudal peduncle; caudal fin with a somewhat broad pale margin; dorsal with numerous black dots.

Three specimens, 90 to 170 mm. in total length.

This species is near *D. antonii*, differing chiefly in the characters of the fins.

*Barilius loveridgii*, sp. n.

Depth of body  $4\frac{1}{2}$  in length, length of head  $4\frac{1}{2}$ . Head more than twice as long as broad. Snout pointed, longer than eye, which is 4 in length of head and slightly less than interorbital width. Jaws equal anteriorly; maxillary reaching posterior third of eye. No barbels. Gill-rakers rudimentary. Dorsal II 8; origin equidistant from centre of eye and root of caudal; last four rays above anal; anterior rays longest,  $\frac{3}{4}$  length of head. Anal III 12; anterior rays much longer than posterior, but not longer than dorsal rays. Pectoral  $\frac{3}{4}$  length of head, slightly falcate, just reaching pelvics. Pelvics reaching anal. Caudal forked. Caudal peduncle longer than deep. Scales with numerous radiating striæ, 40 in a longitudinal series,  $7\frac{1}{2}$  between origin of dorsal and lateral line. Brownish; 8 or 9 short, dark vertical bars on sides of body above lateral line; margin of dorsal and caudal darker.

A single specimen, 98 mm. in total length.

Near *B. ubangensis* and *B. peringueyi*.

*Synodontis maculipinna*, sp. n.

Depth of body  $3\frac{1}{2}$  to  $4\frac{1}{2}$  in length, length of head  $3\frac{2}{5}$  to 4. Head slightly longer than broad, more or less rugose above, except snout, which is rounded or obtusely pointed, and equal to or longer than postocular part of head. Eye supero-lateral, 5 to  $6\frac{1}{2}$  in length of head, 2 to  $2\frac{1}{2}$  in interorbital width. Lips moderately developed. Premaxillary teeth in a broad band, nearly extending across whole width of mouth; 30-40 movable mandibular teeth, almost in a single series, the length of which is from  $\frac{3}{4}$  to  $\frac{7}{8}$  diameter of eye; height of teeth less than  $\frac{1}{2}$  diameter of eye. Maxillary barbel unbranched, without or with a very narrow marginal membrane at base, equal to or slightly longer than length of head; outer mandibular barbel with long slender branches, nearly twice as long as inner, which has stouter and shorter branches. Gill-opening

not extending downwards beyond base of pectoral. Occipito-nuchal shield rough like the occiput, obtusely tectiform, longer than broad, with pointed posterior process. Humeral process much longer than broad, more or less distinctly keeled, sharply pointed, extending as far back as occipito-nuchal process. Dorsal I 6-7; spine equal to or slightly shorter than head, feebly curved, anterior edge smooth except for two or three serrations at the tip, posterior edge feebly serrated. Adipose fin 3 to 4 times as long as deep,  $1\frac{1}{4}$  to a little more than twice its distance from rayed dorsal. Anal IV 7; rounded. Pectoral spine shorter than head, strongly serrated on both sides, not reaching pelvics. Pelvics not reaching anal. Caudal forked, upper lobe the longer. Caudal peduncle as long as deep, or slightly deeper than long. Coloration generally uniform, young sometimes with darker spots separated by a pale network; a black blotch at base of dorsal fin; dorsal and caudal sometimes with series of dark spots.

Nine specimens, 70 to 180 mm. in total length.

Near *S. zambesensis* and *S. depauwi*.

*Tilapia urolepis*, sp. n.

Depth of body  $2\frac{1}{2}$  in the length, length of head nearly 3. Head twice as long as broad. Snout rounded, with straight upper profile, slightly broader than long, as long as postocular part of head. Eye  $4\frac{1}{2}$  in length of head, equal to depth of preorbital; interorbital width  $2\frac{3}{4}$  in length of head. Mouth rather more than  $\frac{2}{3}$  width of head; jaws equal anteriorly; maxillary extending to between nostril and eye; teeth moderately slender, in 5 series, about 70 bicuspid teeth in outer series of upper jaw. 3 series of scales on cheek, width of scaly part nearly equal to diameter of eye. Gill-rakers short, 20 on lower part of anterior arch. Dorsal XVII 13; last spine longest,  $\frac{1}{2}$  length of head; longest soft rays about  $\frac{3}{4}$  length of head. Anal III 10; third spine shorter than longest dorsal. Pectoral as long as head, nearly reaching vertical from origin of anal. Pelvics almost reaching anal. Caudal rounded (?), densely scaled. Caudal peduncle twice as deep as long. Scales cycloid, 32 in a longitudinal series,  $4\frac{1}{2}$  from origin of dorsal to lateral line. Reddish brown, with irregular dark blotches on body; a dark opercular spot, and a dark spot on each side of the nape.

A single specimen, 190 mm. in total length.

Differs from *T. nilotica* in having the caudal densely scaled, and in the longer snout; and from *T. lepidura* chiefly in the character of the dentition.

## BIBLIOGRAPHICAL NOTICES.

*Monograph of the Lacertidæ.* By G. A. BOULENGER, F.R.S. Vol. II. British Museum (Natural History), 1921. Pp. viii + 451. Price £3.

VOLUME I. of this Monograph, published in 1920, dealt with *Nucras*, *Lacerta*, and *Algiroides*; Volume II. deals with the remaining nineteen genera—*Philochortus* to *Holaspis*. Appended is a complete Catalogue of the specimens in the British Museum Collection, comprising over 5000, referable to about 200 species and varieties. In the tabulations of dimensions and scale-formulæ which are given throughout the work numbers of other specimens are also included, each marked with a symbol denoting the museum in which it is to be found; so that in future the student will be able to find any one individual for reference from among this vast material. In this it is an infinitely more comprehensive work than anything of its kind hitherto published, and its value can hardly be overrated. The general arrangement is clear and convenient. From the systematic and philosophic standpoints it constitutes a magnificent piece of work, for it gives one a sound orientation of this difficult group of lizards, so baffling to the novice. So many authors present their subject to the reader in a biased form, suppressing evidence or hypotheses which do not corroborate their own views. Dr. Boulenger never misleads in this way. Moot points are brought forward as such and fully discussed. In dealing with the diphyletic origin of *Scaptira*, for instance, the natural relationships of the Asiatic and South African species are clearly expressed, and his reasons for maintaining them as distinct genera given; at the same time he discusses the principle involved, and adds:—"If, however, objection should be felt to the course here followed, I would suggest uniting the two genera into one, keeping up the different sections as here defined, rather than a further multiplication of the genera" (p. 348).

Herpetologists all over the world will sincerely regret that the 'Monograph of the Lacertidæ' is probably the final work on Zoology from the pen of Dr. Boulenger. In all he has published 29 complete volumes and 875 papers; there is, however, still much to be done, and no one will fill the gap which he has left by his retirement.

*The Complete Nature Book; a complete Handbook and Guide to British Nature Study, embracing the Mammals, Birds, Reptiles, Fish, Insects, Plants, etc., in the United Kingdom.* By S. N. SEDGWICK. Pp. x and 495, pls. 40 (some coloured), and numerous text-figures. T. C. and E. C. Jack, Ltd., London and Edinburgh. Price 12s. 6d. net.

THIS book, as the Author states in the Preface, is very largely a compilation, and this must necessarily be the case in a work dealing with such a variety of subjects. In Part I., the "Animal World,"

the "Vertebrates" are dealt with under Chapters I.-VI., and the "Invertebrates" under Chapters VII.-XV.; Part II, the "Vegetable World," illustrated by many text-figures, extends to five chapters. In the "Introduction" there are suggestions as to the necessary apparatus for the naturalist; the "Appendix" is headed "Some wild pets I have known"—five in all. The Insects occupy pp. 181-299, illustrated by 11 plates, 3 of which are printed in colours. The representative figures of the beetles, 233 in number, occupying 4 plates, photographed natural size, are poor; those of the butterflies and moths fairly good. But if a specialist starts to analyse the text—say, the article headed "Some common British Beetles"—he will find here and there cause for criticism. In the list of the families the Buprestidæ are omitted altogether, the Nitidulidæ consist of a mixture of various Clavicornes, *Blethisa* is wrongly placed under the tiger-beetles (Cicindelidæ) and *Deronectes* under the whirligig-beetles (Gyrinidæ), and so on. Nevertheless, a beginner will find much to help him in naming his captures. Works on special subjects would, of course, be required by the collector when more accurate detail is required. The book is well printed and indexed, and the price at the present time is not high.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

March 8th, 1922.—Mr. R. D. Oldham, F.R.S.,  
Vice-President, in the Chair.

Dr. A. SMITH WOODWARD described certain photographs (natural size) of *Desmostylus* teeth from the Lower Miocene Sandstone of Southern Vancouver Island (B.C.) exhibited by IRA E. CORNWALL, F.G.S.

The exhibitor wrote that these *Desmostylus* teeth are slightly different from any found in either California or Japan, as they show a well-developed cingulum. They may be from an older species than *Desmostylus hesperus*, as recent research has shown that the formation in which they were found is at least Lower Miocene, while the formation in which *Desmostylus* remains have been found in California is Middle Miocene.

One of the teeth shown in the photographs was found in 1916 in the face of the sandstone-cliff west of Muir Creek, Sooke Bay, Southern Vancouver Island (B.C.). It was determined by the late Lawrence M. Lambe as the first right upper molar of *Desmostylus hesperus* Marsh, and is now in the British Columbia Provincial Museum at Victoria. The dimensions of this tooth are: Length = 34 mm.; width = 24 mm.; height of columns

= 17 mm.; diameter of the largest column = 15 mm.; diameter of small column = 10 mm. This tooth is considerably worn. The second tooth was found in the same locality last year by the Rev. Robert Connell. Its dimensions are: Length = 47 mm.; width = 34 mm.; diameter of the largest column = 24 mm.; diameter of the smallest column = 17 mm.

The following communication was read:—

‘On the Geological Importance of the Primitive Reptilian Fauna in the Upper Cretaceous of Hungary.’ By Baron Francis Nopcsa, For. Corresp. G.S.

The Upper Cretaceous of Eastern Hungary can be divided into two horizons, with an unconformity between them. The lower niveau comprises the Cenomanian, Turonian, and Lower Senonian strata, the upper one the uppermost Senonian and the Danian formation.

While the entire lower horizon and the Upper Senonian rocks are of marine origin, the Danian is a freshwater deposit that passes downwards by means of brackish-water beds gradually into the marine strata.

The age of these marine deposits has been well established by different fossils (mostly ammonites); the age of the remarkably-thick freshwater beds is partly determined by their position between the older Maastrichtian and the younger Middle Eocene strata, partly by rolled material containing fossils.

The vertebrate fauna of the freshwater beds has, despite its Upper Cretaceous age, a strikingly Jurassic aspect, for one finds primitive tortoises (among them a new genus) related to *Pleurosternum*, a Camptosaurian Dinosaur (*Rhabdodon*), a remarkably primitive Trachodon (*Orthomerus*), a Sauropodous Dinosaur (*Titanosaurus*) that is generically identical with a Wealden type, an armoured Dinosaur (*Struthiosaurus*) showing still a condyle directed downwards, and a Pterosaurian related to the Wealden *Ornithodesmus*.

The survival of this fauna is explained by the fact that, during the whole of the Cretaceous Period, it was isolated. This isolation brought about a dwarfing of the larger animals (Dinosaurs) but did not affect the smaller forms (crocodiles and tortoises).

In consequence of a general uplift at the dawn of the Eocene and the cooling of the climate, nearly the whole of this fauna became extinct, the different changes brought about by these two factors acting differently upon the different members of the fauna.

The terrestrial Dinosaurs were compelled to give place to the more agile mammals, the herbivorous Dinosaurs of the marshy tracts suffered from the change of the flora, while the warm-blooded Pterosaurians became extinct, on account of the cooling of the climate.

In contrast to this change, those crocodiles which were adapted to a warm-blooded diet survived until the Miocene Period, and only retired to the tropics when the climate became so cold that the palms vanished out of Europe.

April 12th, 1922.—Prof. A. C. Seward, Sc.D., F.R.S., President, and afterwards Dr. H. H. Thomas, V.P.G.S., in the Chair.

The following communication was read:—

‘Oligocene Mosquitoes in the British Museum, with a Summary of our present Knowledge concerning Fossil Culicidæ.’  
By F. W. Edwards, B.A. (Communicated by the Secretary.)

The material dealt with in this paper is in part the property of the Geological Department of the British Museum, and in part belongs to Mr. R. W. Hooley, F.G.S. The study of it was undertaken by the Author at the suggestion of Prof. T. D. A. Cockerell, and by permission of the Keeper of the Department. All the specimens are from the Oligocene of the Isle of Wight.

The result of the study confirms what was already known of the Oligocene Insect-fauna. The genera appear to be inseparable from those living at the present day, and the indications supplied by some of the species suggest a fauna similar to that of the Ethiopian and Oriental regions at the present day.

No light is thrown by the fossils on the phylogenetic history of the Culicidæ, nearly all the recent types being represented in the Oligocene fauna, and no peculiar forms occurring. The genus *Anopheles*, however, has not been found, probably because of its comparative rarity.

The three species described from the Oligocene of the Isle of Wight by Prof. Cockerell are discussed in detail, and are referred to the genus *Aedes* in the broad sense. Two new species, one of *Culex* and one of *Tæniorhynchus*, are described.

A critical summary is given of our present knowledge of fossil Culicidæ. No fossil that can be positively referred to this family is yet known from the Mesozoic.

## MISCELLANEOUS.

*A Correction.* By Lord ROTHSCHILD, F.R.S.

In my article in the May number of this Magazine on the Aretiinæ of Pará, I described a new species under the name of *Robinsonia mossi* on page 486, quite overlooking the fact that I had already given this name to another species on page 458. I therefore rename the species on page 486 *Robinsonia milesi*.



## INDEX to VOL. IX.

- ACANTHOGONYLEPTES, characters of the new genus, 336.  
 Acilota, new species of, 80.  
 Acridinae, new, 99, 539.  
 Acrotylus, new species of, 107.  
 Acutisoma, new species of, 341.  
 Aelopus, new species of, 545.  
 Agorea, new species of, 491.  
 Alcides, new species of, 393.  
 Alexander, C. P., on new or little-known Tipulidæ, 145, 297, 505.  
 Alisalia, new species of, 126.  
 Amastus, new species of, 490.  
 Amaxia, new species of, 465.  
 Annalo, new species of, 479, 488.  
 Amphineurus, new species of, 303.  
 Anæolopus, characters of the new genus, 547.  
 Anagnathocera, characters of the new genus, 525.  
 Ancistrotus, new species of, 344.  
 Andrena, new species of, 248.  
 Andrewes, H. E., on Oriental Carabidæ, 281.  
 Andrews, C. W., on a bear from the Cromer forest-bed, 204.  
 Annelids, notes on, 449.  
 Anophryocephalus, characters of the new genus, 421.  
 Anthidium, new species of, 246.  
 Anthophora, new species of, 300, 665.  
 Arachnida, new, 163.  
 Arctiinae, new, 457.  
 Arrow, G. J., on new African Cetoniine beetles, 525.  
 Atytaina, new species of, 556.  
 Ascaris, new species of, 497.  
 Atanygnathus, new species of, 123.  
 Atarba, new species of, 151, 308.  
 Athis, new species of, 77.  
 Attalus, new species of, 572.  
 Automolis, new species of, 473, 487.  
 Aves, notes on, 411.  
 Azatrephes, new species of, 462.  
 Bagnall, R. S., on some new and rare British Diplopods, 176.  
 Barilus, new species of, 687.  
 Barker, C. N., on new species of Carabidæ from South Africa, 30.  
 Barychara, new species of, 125.  
 Baylis, H. A., on a new Cestode from Spitbergen, 421; notes on some parasitic nematodes, 494.  
 Belonuchus, new species of, 122.  
 Bertholdia, new species of, 488.  
 Bezzi, M., on the first eremochetous dipteran with vestigial wings, 323.  
 Bibliographical notices, 689.  
 Blaine, G., on three new races of Cephalophus monticola, 174.  
 Blair, K. G., on Coleoptera of the Mt. Everest Expedition, 1921, 558; on the Mordellidæ of the Fiji Islands, 562.  
 Blaps, new species of, 559.  
 Boreides, new species of, 324.  
 Brachychara, new species of, 637.  
 Brada, new species of, 7.  
 Brade-Birks, S. G., notes on Myriapoda, 160, 208.  
 Brainia, characters of the new genus, 103.  
 Cabirus, new species of, 86.  
 Catus, new species of, 121.  
 Callistomimus, new species of, 45.  
 Callosciurus, new species of, 90.  
 Calman, W. T., on the holotype of Parazetes auchenicus, 199.  
 Calometopus, new species of, 530.  
 Cameron, M., on new species of Staphylinidæ from the West Indies, 113, 633.  
 Canthyloscelsis, characters of the new genus, 267.  
 Carabidæ, new, 30, 281.  
 Castnia, new species of, 73.  
 Castniinae, new, 68.  
 Centrochromis, characters of the new genus, 534.  
 Cephalophus, new species of, 174.  
 Cerozodia, new species of, 157.  
 Cestodes, notes on, 255; new, 421, 602.  
 Cetoniinae, new, 525.  
 Champion, G. C., on the African species of Ebæus, 217; on the S. African species of Attalus, 570.  
 Charadronota, new species of, 528.  
 Chlenius, new species of, 36.

- Chœromys*, new species of, 390.  
*Cirripedes*, morphology of, 368; notes on, 653, 656, 657.  
*Clinus*, new species of, 533.  
*Clytocosmus*, new species of, 158.  
*Coccinellidæ*, new, 349.  
 Cockerell, T. D. A., descriptions and records of bees, 242, 360, 660.  
*Cœlopygus*, new species of, 345.  
*Coleoptera*, new, 217, 558.  
*Colletes*, new species of, 248, 363.  
 Cooper, C. F., on *Metamynodon bugtiensis*, 617.  
*Cophophryne*, new species of, 583.  
*Coproporus*, new species of, 123.  
*Crassisoma*, new species of, 684.  
 Crawley, W. C., on new ants from Australia, 427.  
*Cretiscalpellum*, characters of the new genus, 374.  
*Cricetus*, new species of, 180.  
*Urocidura*, new species of, 88.  
*Crossotarsus*, new species of, 137.  
*Cryphalus*, new species of, 141.  
*Cteniopinus*, new species of, 560.  
*Cyparissias*, new species of, 70.  
*Darwinomyia*, characters of the new genus, 277.  
*Deinopsis*, new species of, 123.  
 Dendy, A., note on the genus *Tragosa*, Gray, 169.  
*Deuterophlebiidæ*, new, 380.  
*Dianthidium*, new species of, 660.  
*Dicranomyia*, new species of, 505.  
*Diestota*, new species of, 633.  
*Dimorphia*, characters of the new genus, 273.  
*Diochus*, new species of, 116.  
*Dioryche*, new species of, 238.  
*Diplopoda*, new, 176.  
*Diptera*, new, 145, 271, 297, 323, 379.  
*Discocyrtus*, new species of, 332.  
*Distichodus*, new species of, 686.  
*Dorcopsis*, new species of, 264.  
*Dorcopsulus*, new species of, 672.  
*Ebæus*, new species of, 219.  
*Echinoids*, notes on, 587.  
*Ecpanthera*, new species of, 492.  
 Edwards, F. W., on a new genus of Scatopsid flies, 267; on the Jurassic dipteran, *Platyura fittoni*, 269; on a remarkable dipterous insect from Kashmir, 379.  
*Elysium*, new species of, 489.  
*Epilachna*, new species of, 349.  
*Epinephela*, new species of, 668.  
*Epipsylla*, new species of, 555.  
*Erinaceus*, new species of, 624.  
*Erythrocastnia*, new species of, 75.  
*Eucera*, new species of, 361.  
*Euceraphelus*, characters of the new genus, 579.  
*Eumenia*, new species of, 2.  
*Euphaonia*, characters of the new genus, 271.  
*Eupsudosoma*, new species of, 464.  
*Euvara*, new species of, 648.  
*Exochomus*, new species of, 351.  
 Fauvel, P., on polychæt annelids from Spitzbergen, 449.  
*Fauveliopsis*, characters of the new genus, 4.  
 Geological Society, proceedings of the, 455, 629, 690.  
 Gilchrist, J. D. F., on the oesophageal teeth of the Stromateidæ, 249.  
*Globocephalus*, new species of, 683.  
*Glyphidrilus*, new species of, 53; note on, 387.  
*Gnathocera*, new species of, 526.  
*Gnophomyia*, new species of, 150, 307.  
*Gnypetosoma*, characters of the new genus, 127.  
*Gonyleptes*, new species of, 335.  
*Gonyleptidæ*, new, 329.  
*Gonyleptoides*, new species of, 340.  
*Gynoplistia*, new species of, 154, 311, 518.  
*Gyrophæna*, new species of, 639.  
*Halictus*, new species of, 662.  
*Halisidota*, new species of, 481, 491.  
*Hedybius*, new species of, 581.  
*Helictis*, new species of, 196.  
*Helina*, new species of, 274.  
*Helodrilus*, new species of, 136.  
 Hesse, A. J., on the genitalia of (*Ancistrocephalus*) *polypteri*, 255.  
*Heterorrhina*, new species of, 527.  
 Hinton, M. A. C., on the mammals of the 1921 Mount Everest Expedition, 178.  
*Hispinæ*, new, 569.  
*Holacanthus*, new species of, 318.  
*Holisus*, new species of, 117.  
*Holorusia*, new species of, 523.  
*Homoptera*, new, 553.  
*Hydromys*, new species of, 264.  
*Hymenoptera*, new, 242, 360, 660.  
*Hypernephia*, characters of the new genus, 551.  
*Idalus*, new species of, 459.

- Ithaia*, new species of, 334.  
*Isodon*, new species of, 678.  
 Jackson, A. R., on spiders from Spitzbergen and Bear Island, 163.  
*Jaculus*, new species of, 296.  
 Khalil, M., on some new nematode parasites, 212, on a new *Ankylostome* from a leopard, 596.  
 Kloss, C. B., *see* Robinson, H. C.  
 Laing, F., on some Fijian Psyllidæ, 553.  
 Lambert, J., on neogene echinoids from the Island of Anguilla, 587.  
 Lane, C., on two *Strongylata* from swine in the Pacific, 683.  
 Larius, notes on, 411.  
*Lathrobium*, new species of, 113.  
 Lathy, P. I., on the Castniina in the collection of Madame Gaston Fournier, 68.  
*Lebia*, new species of, 30.  
*Leiperenia*, characters of the new genus, 215.  
*Lepidocoleus*, new species of, 654.  
*Leptynoptera*, new species of, 554.  
 Leva, new species of, 540.  
*Liarthodes*, characters of the new genus, 346.  
*Linnophila*, new species of, 152, 309, 513.  
 Linnberg, E., on eastern hedgehogs, 620.  
*Lonnburya*, character of the new genus, 542.  
*Lovenia*, new species of, 588.  
 McIntosh, Prof., notes from the Gatty Marine Laboratory, St. Andrews, 1.  
*Macromastix*, new species of, 314, 524.  
*Macropus*, new species of, 670.  
*Mallocephala*, new species of, 493.  
 Malloch, J. R., on exotic Muscidiæ, 271.  
 Mammals, new, 87, 142, 178, 187, 193, 196, 204, 260, 261, 265, 266, 295, 315, 389, 413, 669, 680, 681.  
 Marshall, G. A. K., on new Alcides from the Oriental Region, 303.  
 Martino, V. and E., on a new snow-vole from Montenegro, 413.  
 Maulik, S., on two new African Hispid beetles, 569.  
*Megachile*, new species of, 365.  
*Melinna*, new species of, 9.  
 Mello Leitão, Dr., on some new Brazilian Gonyleptidæ, 349.  
*Melogale*, new species of, 194.  
*Melomys*, new species of, 263.  
*Memphisia*, characters of the new genus, 213.  
*Meranoplus*, new species of, 443.  
*Mesotrichia*, new species of, 666.  
*Metalia*, new species of, 590.  
*Metalimnophila*, characters of the new subgenus, 512.  
*Metarthodes*, new species of, 347.  
*Meteusaroides*, characters of the new genus, 330.  
*Metopomyia*, characters of the new genus, 272.  
*Micaria*, new species of, 166.  
*Microcosmus*, new species of, 35.  
*Microtus*, new species of, 413.  
*Miscelus*, new species of, 292.  
*Molophilus*, new species of, 145, 297, 510.  
*Monochinus*, new species of, 569.  
*Monomorium*, new species of, 447.  
*Mordella*, new species of, 562.  
*Mordellistena*, new species of, 566.  
 Morio, new species of, 33.  
*Murshidia*, new species of, 214.  
*Myllæna*, new species of, 650.  
*Myriapoda*, notes on, 160, 208.  
*Myrmecia*, new species of, 429.  
*Mystax*, new species of, 265.  
*Neidalia*, new species of, 486.  
*Nematodes*, new, 51, 129, 212, 387, 413, 494.  
*Neobisnius*, new species of, 118.  
*Neomitobates*, new species of, 343.  
*Neopucrobia*, new species of, 329.  
*Neritos*, new species of, 469.  
*Nesoromys*, characters of the new genus, 263.  
*Nomia*, new species of, 663.  
 Norman, J. R., on new fishes from Zululand and Natal, 318; on fishes from Tobago, 533; on four new fishes from Tanganyika territory, 686.  
*Nothophila*, characters of the new genus, 512.  
*Notomalachius*, characters of the new genus, 580.  
*Notomys*, new species of, 316.  
*Nyctimene*, new species of, 262.  
*Ochotona*, new species of, 184, 187.  
*Odontomachus*, new species of, 437.  
*Oligota*, new species of, 124.  
*Orthoptera*, new, 99, 539, 551.  
 Ortlepp, R. J., on a new *Trichostongyle* genus, 413, on a new

- Davaineid cestode from a wallaby, 602.
- Pachylibunus*, new species of, 333.
- Pæderomimus*, new species of, 121.
- Palustra*, new species of, 493.
- Paracelioxys*, new species of, 365.
- Paraechinus*, new species of, 142.
- Paragonyleptes*, new species of, 337.
- Paranerita*, new species of, 467.
- Paraparga*, new species of, 519.
- Pareuchætes*, new species of, 479.
- Pelochrous*, new species of, 578.
- Peroryctes*, new species of, 264.
- Petrogale*, new species of, 682.
- Phaiomys*, new species of, 182.
- Phalanger*, new species of, 673, 680.
- Phidodonta*, new species of, 570.
- Philonthus*, new species of, 119.
- Phymella*, characters of the new genus, 109.
- Phyracaces*, new species of, 433.\*
- Pisces*, notes on, 249; new, 318, 533, 686.
- Placusa*, new species of, 635.
- Platynus*, new species of, 50.
- Platypodidæ*, new, 137.
- Platypus*, new species of, 140.
- Podomyrma*, new species of, 441.
- Polychæta*, recent additions to marine, 1.
- Pretoriana*, characters of the new genus, 99.
- Procter, J. B., on a new toad, 583; on a new *Typhlops* from Tanganyika territory, 665.
- Progoniosoma*, new species of, 340.
- Progonyleptes*, new species of, 334.
- Progonyleptoides*, characters of the new genus, 333.
- Pronomæa*, new species of, 652.
- Prumala*, new species of, 462.
- Pseudochirus*, new species of, 264, 674.
- Psorolyma*, characters of the new genus, 358, 360.
- Psyllidæ*, new, 553.
- Pteridopharynx*, new species of, 212.
- Pycnogonida*, notes on, 199.
- Quilonia*, new species of, 214.
- Rao, C. R. N., on some new species of earthworms, 51.
- Rattus*, new species of, 94, 262.
- Ratufa*, new species of, 89.
- Rhinobatus*, new species of, 318.
- Rhytidopneum*, new species of, 434.
- Riddell, W., on a hermaphrodite specimen of *Amphioxus*, 613.
- Robinson, H. C., and Kloss, C. B., on new mammals from French Indo-China and Siam, 87.
- Robinsonia, new species of, 457, 486.
- Rothschild, Lord, on the names of certain parrots, 411; on *Arctiinae* from Pará, Brazil, and other localities, 457; on a new form of *Epinephela* from Cyrenaica, 608; a correction, 692.
- Sampson, Winn, on new *Platypodidæ* and *Scolytidæ*, 137.
- Scarites*, new species of, 34.
- Schalotomis*, new species of, 470.
- Sciæna*, new species of, 319.
- Scintharista*, new species of, 105.
- Scolytidæ*, new, 137.
- Scymnillodes*, characters of the new genus, 355.
- Scymnillus*, new species of, 354.
- Scymnus*, new species of, 353.
- Sicard, Dr., on new varieties, species, and genera of *Coccinellidæ*, 349.
- Silusa*, new species of, 634.
- Sminthopsis*, new species of, 265.
- Sodreana*, characters of the new genus, 347.
- Somoleptus*, new species of, 114.
- Staphylinidæ*, new, 113, 633.
- Stenomys*, new species of, 263, 660.
- Stephenson, J., on some earthworms from India and Palestine, 129; on some supposed new species of earthworms, 387.
- Stromateidæ*, note on, 249.
- Strongylata*, note on, 683.
- Synodontis*, new species of, 687.
- Syntarctia*, new species of, 480.
- Tamiops*, new species of, 92.
- Tautatus*, new species of, 99.
- Tetraloniella*, new species of, 361.
- Thecturella*, characters of the new genus, 648.
- Thomas, O., on hedgehogs from the Persian Gulf, 142; on the mammals of the 1921 Mount Everest Expedition, 178; on some new forms of *Ochetona*, 187; some notes on ferret-baggers, 193; on the systematic arrangement of the marmosets, 196; on a subdivision of the genus *Uromys*, 260; on new mammals from New Guinea &c., 261; on a new marmoset from the Lower Amazons, 265; on the generic classification of the *Taphozous* group, 266; on the forms of *Jaculus jaculus* in Egypt and

- Syria, 295; on two new jerboas, 315; on the "ground-hogs" or "cane-rats" of Africa, 389; on mammals from N.E. New Guinea, 669; on two new subspecies of *Phalanger orientalis*, 680; on a new rock-wallaby, 681.
- Thryonomys*, new species of, 392.
- Tilapia*, new species of, 688.
- Timicra*, new species of, 147.
- Tipula*, new, 145, 297, 505.
- Tipulidæ*, new, 267.
- Tragosia*, note on, 169.
- Trichius*, new species of, 529.
- Trichohelix*, characters of the new genus, 420.
- Tricyphona*, new species of, 521.
- Trophonia*, new species of, 8.
- Tupaia*, new species of, 87.
- Typhlops*, new species of, 685.
- Uropachylus*, characters of the new genus, 329.
- Ursus*, new species of, 204.
- Uvarov, B. P., on South-African grasshoppers, 99, 539; on a new grasshopper from Mount Everest, 551.
- Virbia*, new species of, 486.
- Wellcomia*, new species of, 494.
- Withers, T. H., on the morphology of some Cretaceous Cirripedes, 368; on the "Cirripede" *Lepidocoleus*, 653; on an example of *Scalpellum fossula*, 656; on the holotype of *Scalpellum angustum*, 657.
- Woodward, B. B., on the forward progression of the animal of the Nautiloidea and Ammonoidea, 536.
- Xanthocastnia*, new species of, 76.
- Xantholinus*, new species of, 115.
- Xenolispa*, characters of the new subgenus, 279.
- Ypiranga*, characters of the new genus, 331.
- Zelandotipula*, characters of the new subgenus, 522.
- Zoological Record, 216.

END OF THE NINTH VOLUME.

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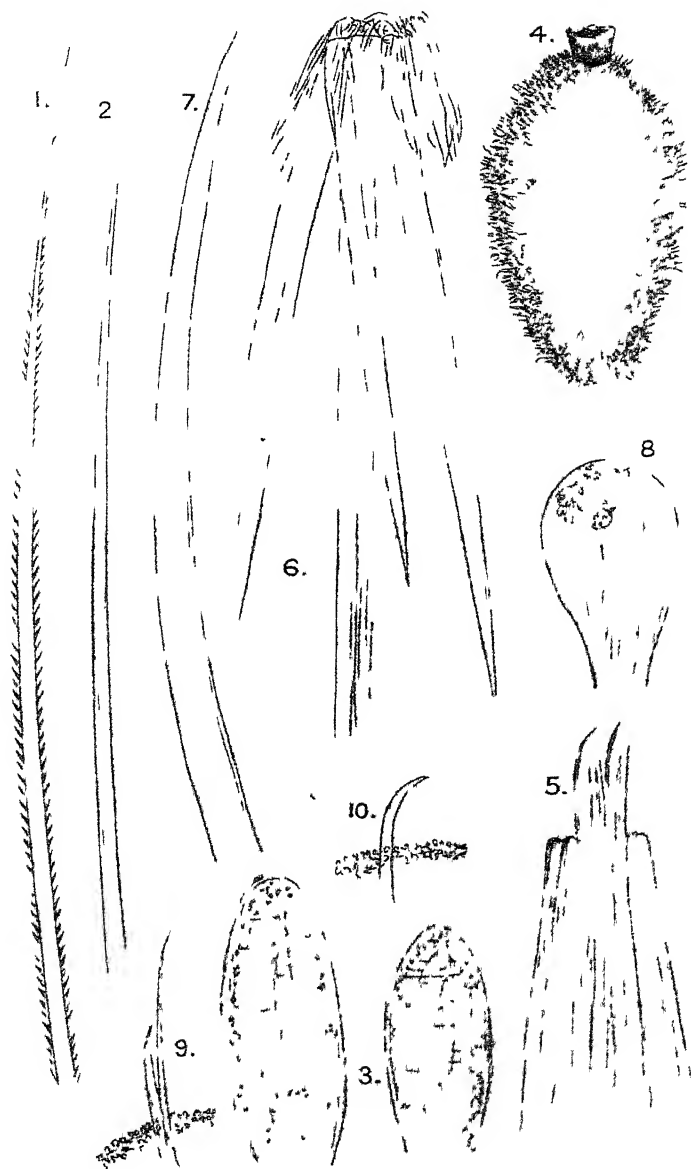
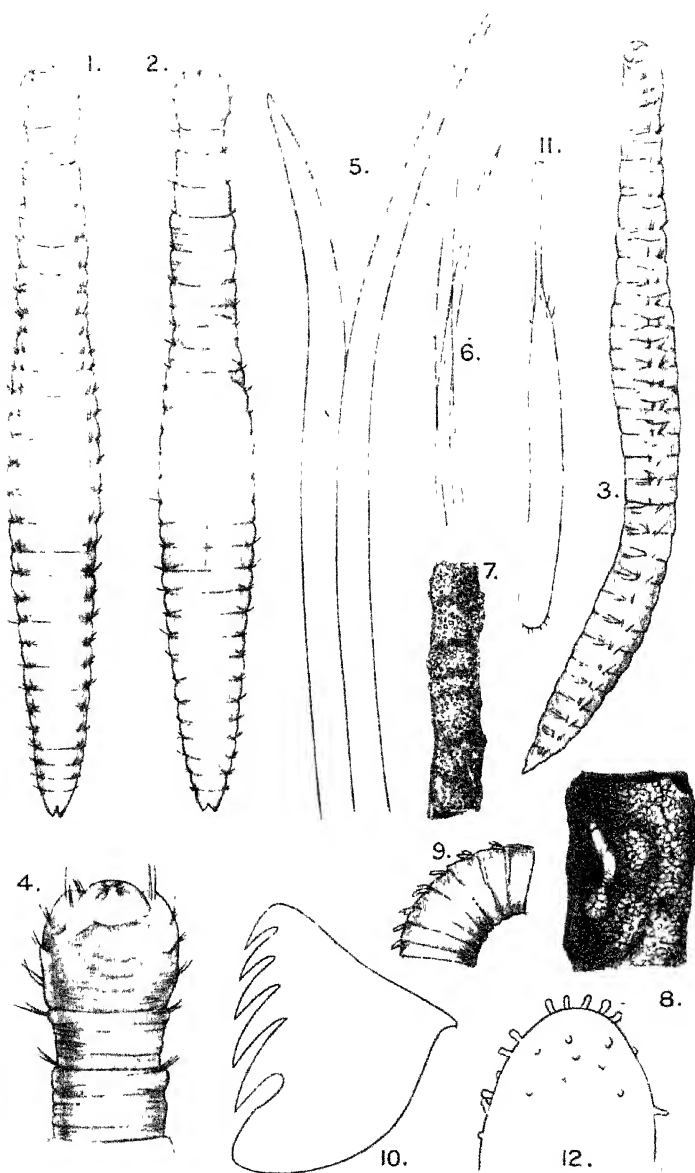


Fig 4 A H W cutera W C M

FAUVELIOPSIS AND EUMENIA CAULLERYII.

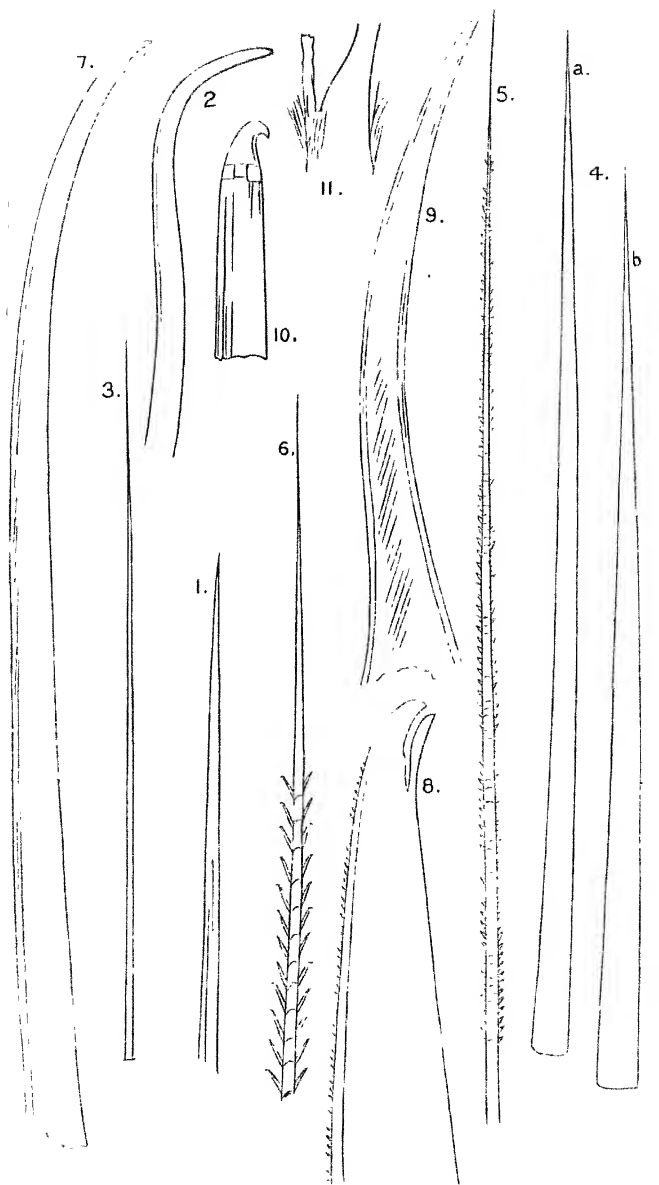




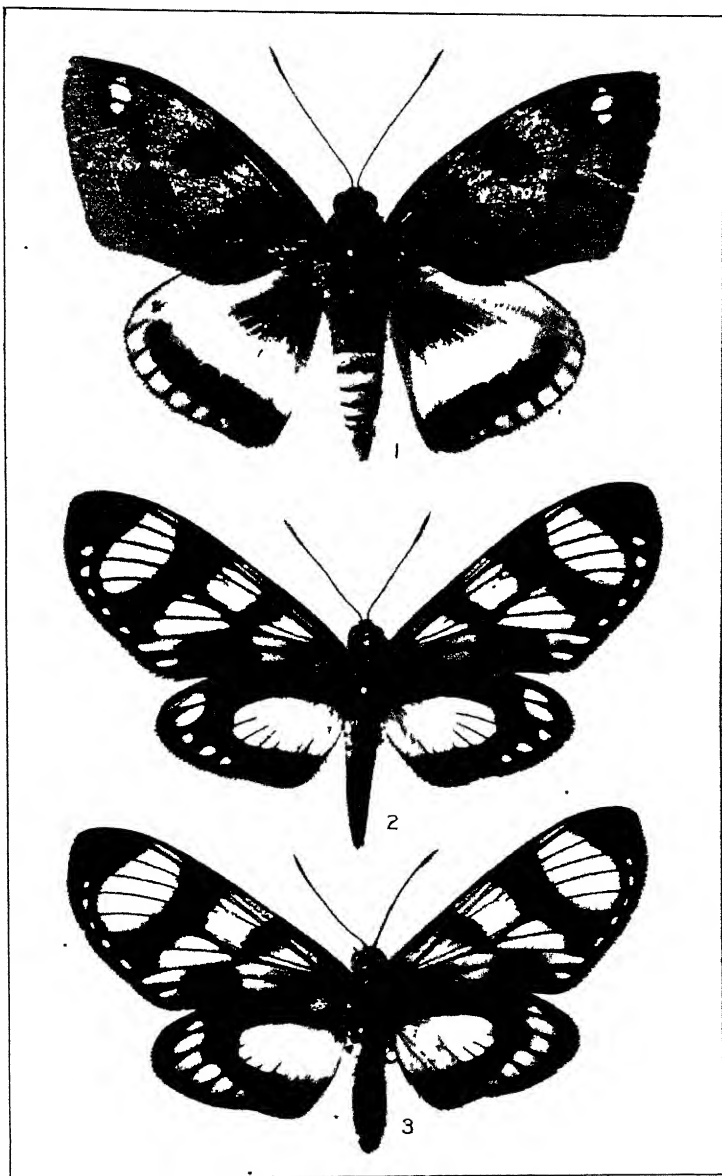


*Figs 1-4, 7 & 8 A. H. W., cetera W. C. M.*

FAUVELIOPSIS, MELINNA, AND PHASCOLOSOMA





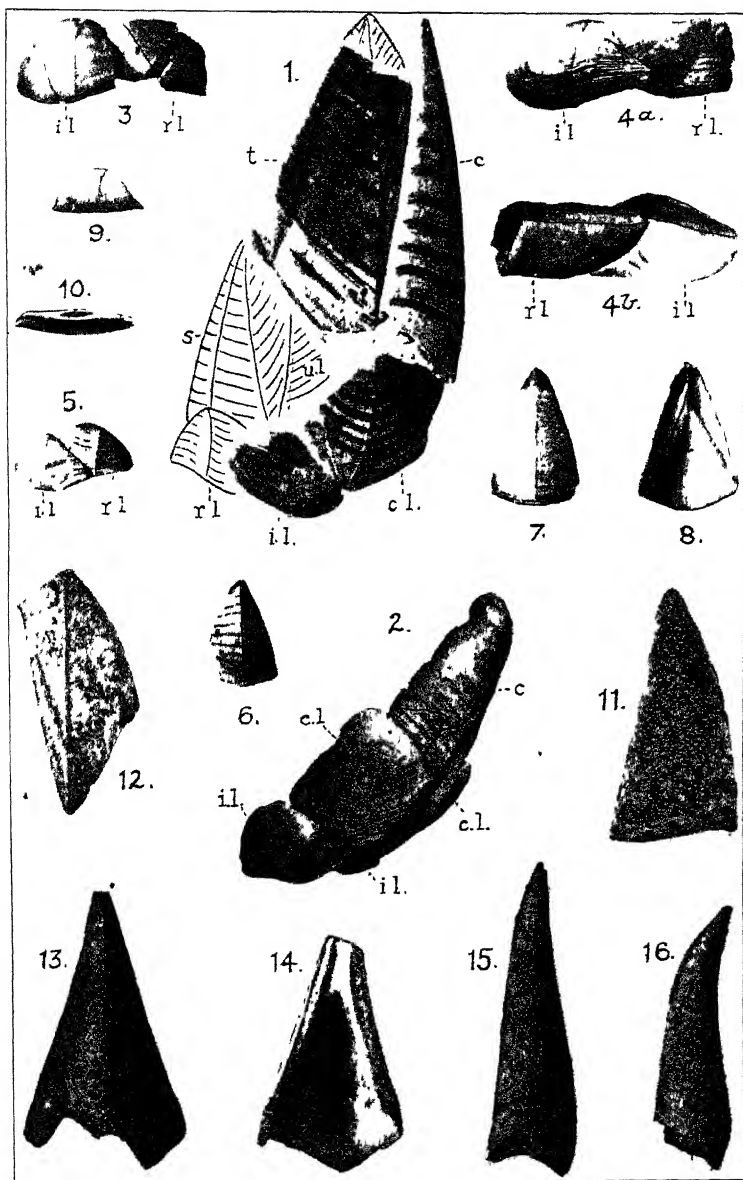


Castniinae in the Collection of Madame Gaston Fournier

*Athis fourneri*, sp. n.    2. *Cabirus linus*, Cram.

3 *Cabirus omissus*, Rothsch.

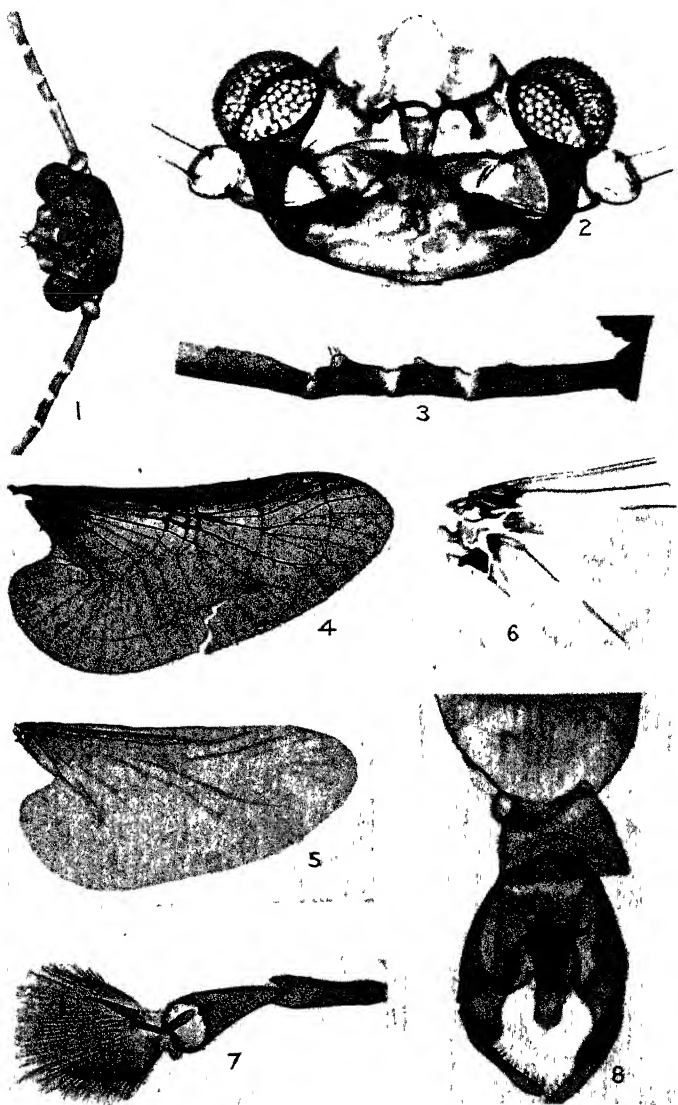




*H. G. Herring, photo.*

SCAPPELLUM (CRETISCAPPELLUM).



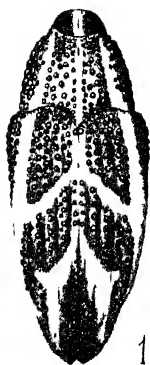


*F. W. Edwards, photo.*

DEUTEROPHLE







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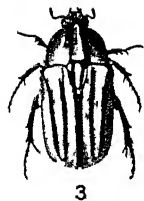
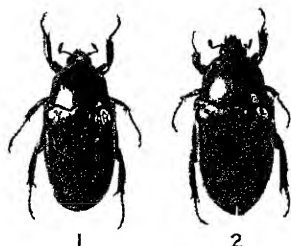


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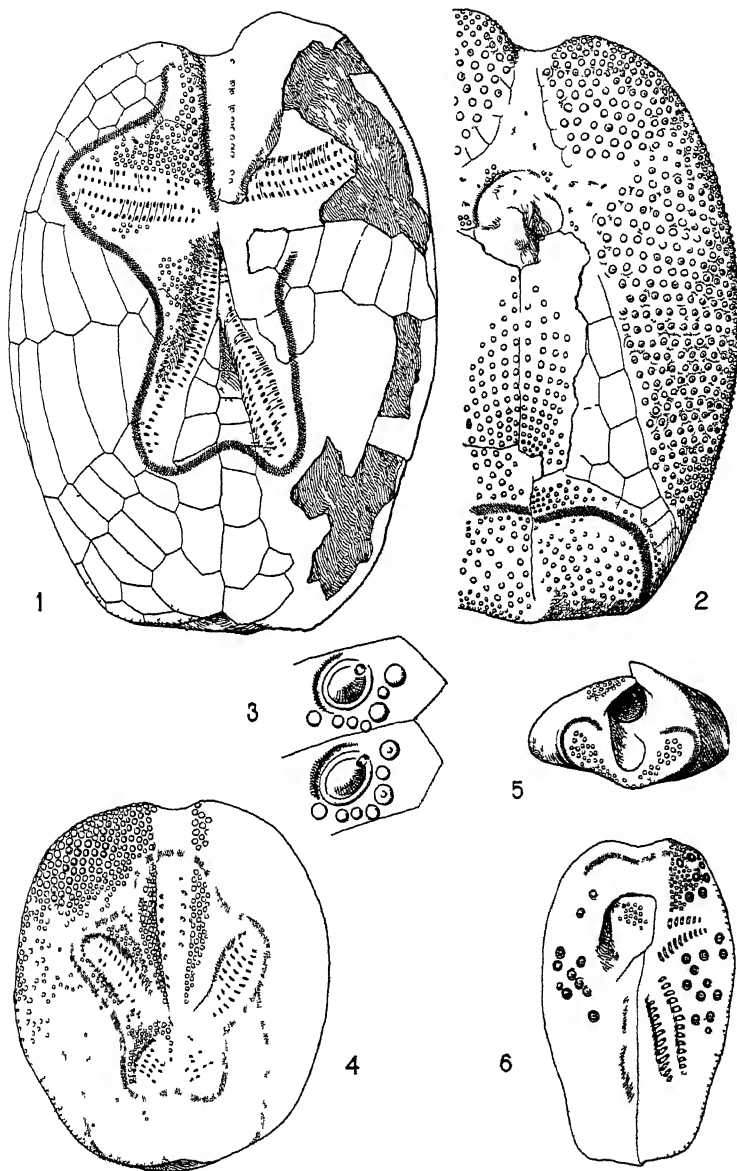
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New African Cetoniine Beetles.

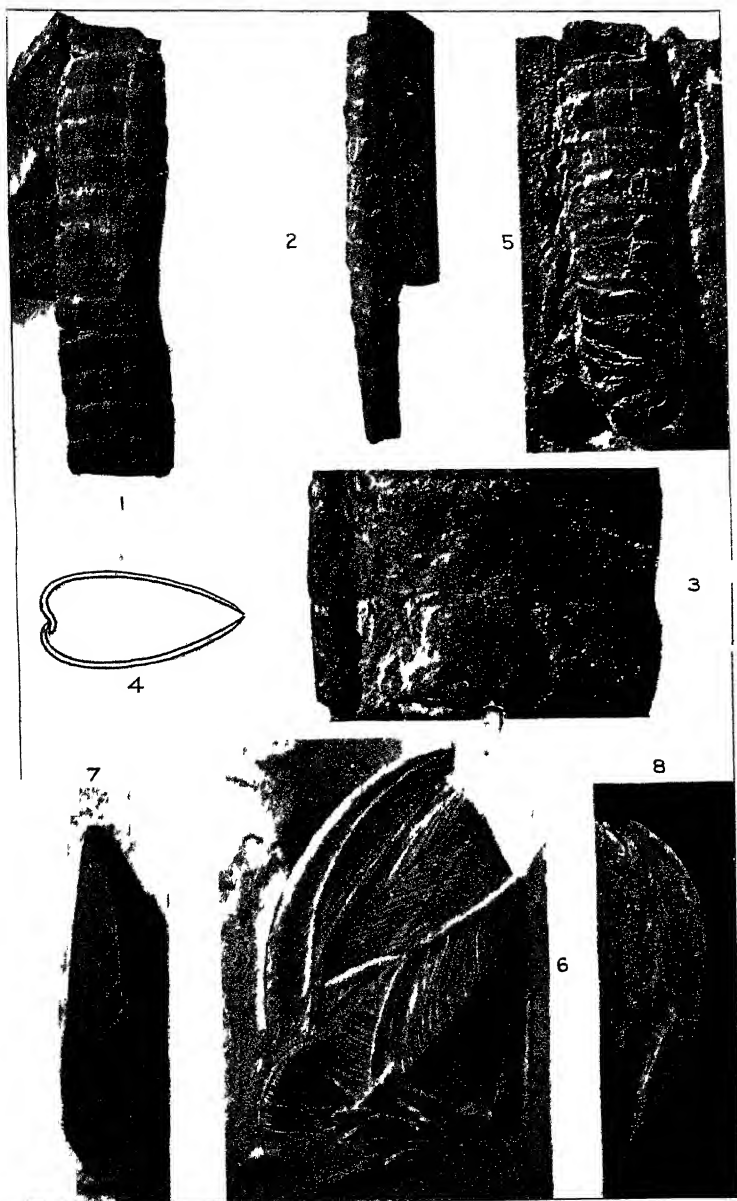




F A Bather dir

Neogene Echinoids from the Island of Anguilla





*Herring photo*

LEPIDOCOLEUS AND SCALPELLUM (ARCOSCALPELLUM).



